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THE MIND AND CHARACTER OF LISTER*

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I AM sincerely grateful to those of your appointed officers who last fall asked me to deliver this, the Fifth, Listerian Oration, under the auspices of the Lister Club of this Association. It is not alone the honour that I prize, great as that is; much more is it the opportunity of being numbered in the honourable company of those, throughout the world, who have been entrusted with the task of paying homage to this great man, and of keeping green his memory. It is a pious task; and let us think of that word in its original sense, which may connote the idea of filial affection as well as that of a religious duty. For, indeed, he was our father in science, to be revered and loved, and each one of us may well in spirit (though the analogy is but half applicable) play Pius Æneas to his Anchises.

To attempt to say something new is a natural desire of the orator; but concerning Lister, as concerning Harvey or John Hunter, this is now practically impossible. The chorus of his praise has become almost a liturgy, and one can only hope to write the liturgy in somewhat different phrases. Yet there are always new hearers, new followers, new disciples, who desire to have retold to them the story that was familiar to their predecessors. And mere repetition has its own value; for out of it grows tradition, and Lister has become a beautiful and inspiring tradition. So that the words that I speak today, will, I trust, be welcomed by many as being new to them. In this sense, then, I need make no apology for putting before you here my own estimate—for it has to be my own, if it is to be sincere—of the character and the mind of Joseph Lister.

*Delivered at the Sixty-seventh Annual Meeting of the Canadian Medical Association, Victoria, June 26, 1936.

But before going on, let me devote a few words to the memory of our Canadian surgeons who were pupils of Lister. First in time came Archibald Malloch, of Hamilton, admirable both as man and surgeon, who was a student under Lister from 1864 to 1866, during the Glasgow period, and his house-surgeon in 1868. To him we owe the introduction of Lister's system in Canada. Then followed Baldwin and Grassett of Toronto, Stewart of Halifax, Roddick and Hingston of Montreal. All these returned to carry out in our country the Listerian principles; and one may venture to say that in our larger eastern cities antiseptic surgery received an earlier and wider acceptance than in the United States or in London itself, where Lister from 1877 to the 90's encountered such extraordinary opposition.

But it is of John Stewart, the Founder of this Oration, that I desire chiefly to speak. No more beautiful, no more poetical, no more loving nor true words in honour of Lister's memory have been penned than those which John Stewart wrote in the introductory paragraphs of the first Listerian Oration in 1924. He, alas, has gone from us; and those who knew him well know also that he left this world entirely confident of seeing again his friend and his old master. Both were of the old faith, and neither said much about it. Which is well! Stewart took Lister in all points as his exemplar. He resembled Lister in character—in his conception of religion (not alone in the narrow sense of the word, although certainly in that also); in his pitying care for the sick, in his devotion to truth, in conscientiousness, in all high ideals. But Lister's life was passed in relative luxury, in great cities, in large hospitals; he could always follow his bent; his ambitions

suffered no real check; he never had to contend with the handicap of hardship; he loved surgery and he loved what we now call research, and there was no let to his doing both; and the end crowned the work—gloriously! John Stewart's life, in contrast, was much fuller of those sacrifices of time, leisure, and rest, which go with practice in a relatively small and poor community. And we need hardly hesitate to say that, in this aspect, his character was the finer inasmuch as denial of self was added to all the other qualities which adorned them both. He, himself, I fear, could he hear these words, would be ill-pleased with this comparison, as an offence to his simple modesty, and as a kind of derogation of his beloved master. But his ill-pleasure would but confirm the truth thereof. To him we owe the first Oration, which, being the fruit of intimate service and companionship, will stand always as the most authoritative account in Canada of Lister's life and character. It will stand, too, as a model of English prose. He was one of the early disciples who became an apostle, and, returning to his own far corner of the earth, preached the saving gospel of antisepsis. We welcome this opportunity of remembering John Stewart at the same time as we remember Joseph Lister.

Fig. 1

My predecessors in this Foundation have told you most of the facts of Lister's life. John Stewart's Oration was that of an ardent disciple; he gave us an intimate picture of the man of science and the man of heart. Sherrington and Muir were supremely capable of interpreting to us Lister's original work in physiology and in pathology, and of the influence of that work in leading on to his great discovery; and Moynihan, master of the *mot juste* and the striking phrase, gave us a brilliant and sympathetic story of Lister in all his aspects. All these knew Lister personally. And now I come, who knew not Lister, but still, as do all men of knowledge and of good will, revering him. I fear my range must rest at lower levels.

To set the stage, as it were, let me begin with a very brief recital of the main events in Lister's life. Born in 1827 into a Quaker family, to parents who were cultured and in affluent circumstances, Lister was given a good education in a Quaker school for boys. At the age of twenty he took his degree in Arts at University College, London, and at twenty-three his degree in Medicine at the same University. He became house physician to Dr. Walshe, and in the following year house-surgeon to the celebrated Erichsen; and then, at twenty-six, he went north to Edinburgh to study under James Syme. Within two years, in 1856, at the age of twenty-eight, he was appointed Assistant Surgeon to the Edinburgh Infirmary. In January, 1860, at the age of thirty-two, he was elected Regius Professor at the University of Glasgow. Such a meteoric rise, at so early an age, must excite our wonder. But Lister was from the first exceptional. He was a pioneer, breaking new ground; he had a new message, and his local world was not slow to recognize his work and give the proper reward.

In Glasgow, and, to be precise, in the year 1865, he discovered the Principle of Antisepsis; and he devoted the rest of his surgical life, from 1865 to 1893, that is, from the age of thirty-eight to that of sixty-five, to the elaboration of that Principle. In 1869 he was recalled to Edinburgh as Professor of Surgery. In 1877 he was invited to assume the Chair of Surgery at King's College, London, and in 1893, at the retiring age of sixty-five, he gave up both public and private surgical work. During his later years he gave many public addresses, acted as President of the Royal Society, studied the new and fast-developing science of bacteriology, and furthered the work

of the Jenner Institute, which was then renamed The Lister Institute of Preventive Medicine. He died in 1912, crowned with the highest honours that Britain and Europe could bestow. If one were to attempt to summarize the great achievement of his life, one might say that he found Surgery wallowing in a Serbonian bog of infection; he lifted it out of its foulness, and established it in a high and clean land—a land of marvellous fertility and capable of limitless expansion.

I shall not attempt to paint for you the gloomy picture of pre-antiseptic surgery in order to make clear the incalculable benefits to humanity of Lister's discovery of the principle of antisepsis; that is too well known to you. Nor shall I be at pains to tell you in detail of Lister's work, save in a very general way, and only in so far as that work illustrates the man himself. Let me rather try to put before you a picture of Lister as a man, as a social being; of the surgeon on his human side; and then endeavour to analyze the quality of his intellect as a scientist. This task is an easy one, in so far as his public life is concerned, for we have many accounts, written by his colleagues and his students, upon which to draw; but his home life, and rightly so, is much less clear to the historian, for he was a shy, somewhat reticent man, not given to speaking of intimate things. Nor is his life among intimate friends of his own age much plainer, for he had few such, and correspondingly few records are available. One wonders if he ever had a chum. Those who have written of his life were chiefly his students, dressers, clerks, and assistants, all much younger than himself. Godlee, his most authoritative biographer, was his nephew; and Godlee tells us that Lister's father was his only real confidant. The letters that passed between the two have been preserved; but the more intimate passages, those which might have revealed the underlying man, were not for the common eye. That suppression was in obedience to Lister's expressed wish.

Fig. 2

I should like first to show you a few of his photographs and portraits, even if some of these may be familiar to you, for Lister's character was largely revealed in his face. I have chosen two of his youth, one in early middle age and one when old. The first picture shows him at the age of twenty-eight. The second is a group photograph of the resident housemen of the Royal Infirmary at Edinburgh in 1855, in which Lister is seated in front, with David Christison on his left. Here too he is twenty-eight, and he is Syme's house-surgeon. One notes immediately the fine forehead and the wide-set eyes; the general impression is one of grave earnestness and of intellectual capacity. He was even then looked up to by the others, who called him "The Chief". The third photograph was taken at the age of forty-two, that is, in 1869, at the close of his Glasgow period, or just after his return to the Professorship in Edinburgh. The fourth portrays him at the age of sixty-nine, as President of the Royal Society. The passing of the years brought no change in his features or in his expression. From first to last he was habitually serious, thoughtful, quiet, controlled. Now that you have seen his outward appearance, let us go on to the study of the man—of his mind and his character.

LISTER'S MIND

From his early boyhood Lister was essentially the student. His teacher of classics in the Quaker school records that young Joseph not only studied his task for the day but read far beyond that task, so that he, the teacher, was obliged to get up early in the morning to keep pace with his pupil. At the age of fourteen we find him writing to his father that he had that afternoon drawn on paper all the bones of the cranium, and named them, and had then gone on to draw the bones of the wrist, naming them, too, which, I fancy, few of those here present could do. At that age, also, he had dissected many of the lower animals. In another letter he writes that he had mounted

the skeleton of a frog on a piece of wood, stolen from his sister's desk (begging his father not to tell her). While still a student in his final year in Medicine at University College Hospital, he published his first original papers upon the muscle of the iris, and upon the muscle of the *arrectores pilorum*.

This work was but an earnest of what was to come, for with routine knowledge he was never content. His passion was to acquire new knowledge. There was inborn in him that divine curiosity which is the very foundation of the mental structure of all discoverers. His ruling preoccupation lay in the constant endeavour to find out, to uncover the reason, the meaning, the cause of things. His life must have been a happy one if the old Latin tag is true, which has it that "He is happy who has been able to recognize the causes of things". The unknown always drew him. If the digression may be pardoned, one might easily imagine Lister at this early age following in the steps of his teacher, Sharpey, and devoting his life to pure physiology. What a loss would have been that! How fortunate that he preferred a career in surgery! But what made one of his gentleness of nature choose surgery, a profession which, more than any other, was calculated in that age to wring the heart not merely with horror, but, beyond that, with despair? Hey Groves's phrase, "the great adventure of surgery", may be in part the answer. But there is more than that. The attraction of surgery to many young minds, especially to the reasoning mind, lies in the satisfaction of its logic, in the concreteness and finality of its syllogisms. The premises are so frequently clear, and the conclusion so natural and definite; much more so than in the practice of internal medicine, at any rate in Lister's day. The investigative spirit is more quickly and clearly rewarded. Investigation was the foundation stone of Lister's intellectual life. The study and practice of surgery offered him, as I think, both challenge and promise. It does still to studious minds. Under Syme, in these early years, he found himself in the very centre of the fray, under the acknowledged leader of the surgical army. But we may still ask how a nature so full of gentleness and pity for the sick could endure the emotional strain imposed by the horrible infections of the surgical wards of his day. Yet he writes to his father from Edinburgh, at the age of twenty-six, "Thou canst hardly conceive what a high degree of enjoyment I am from day to day experiencing in this bloody and butcherly department of the healing art", and to his mother, at the age of thirty, that he feared "that the mode of life so much in accordance with my taste, as mine now is, must be too pleasant to be proper for me". I like to think that, over and above his love of science, the hope, even at that early stage of his life, of resolving one of the greatest problems of his time (the prevention of sepsis), overcame everything else. Batty Tuke records that, in 1854, when he was a young student, Lister showed him a perfectly healing wound, and said, "The main object of my life is to find out how to procure such a result in all wounds".

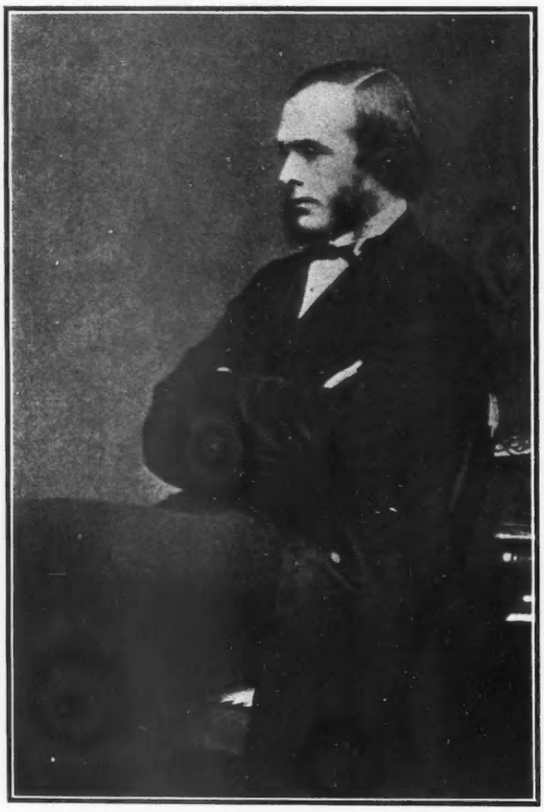

Fig. 3.—Joseph Lister, aged 42. Photograph taken in 1869, the year of his appointment as Professor of Clinical Surgery, University of Edinburgh.

However that may be, one thing is certain, that the love of investigation was paramount. He writes, when engaged in his early studies of inflammation, of spending "glorious nights" watching the changes in the capillaries of the frog's web, after applying various irritants. A *terra incognita* has always exerted a profound attraction upon scientific minds. The wanderings of all explorers attest this fact. Here, then, in that terrible and apparently insoluble problem

of wound infection was a *terra incognita;* here was a worthy quest—to find out the cause; here was a worthy goal—to prevent the workings of such a cause when found. Did not Lister in his much thinking definitely propose this goal to himself? And therein find for the satisfaction both of mind and of heart that impulse which drove him to the study of surgery? For he was an eminently practical man. He had a great mind but also a great heart. I suggest that his heart impelled him to choose a path of science which might at the same time give promise of the relief of suffering. Love, in the ordinary sense of the term, was not the salient part of his temperament. Its place was taken by pity; and in the practice of surgery he could find the amplest scope both for discovery of new knowledge and for that affectionate pity towards suffering which translates itself into active help.

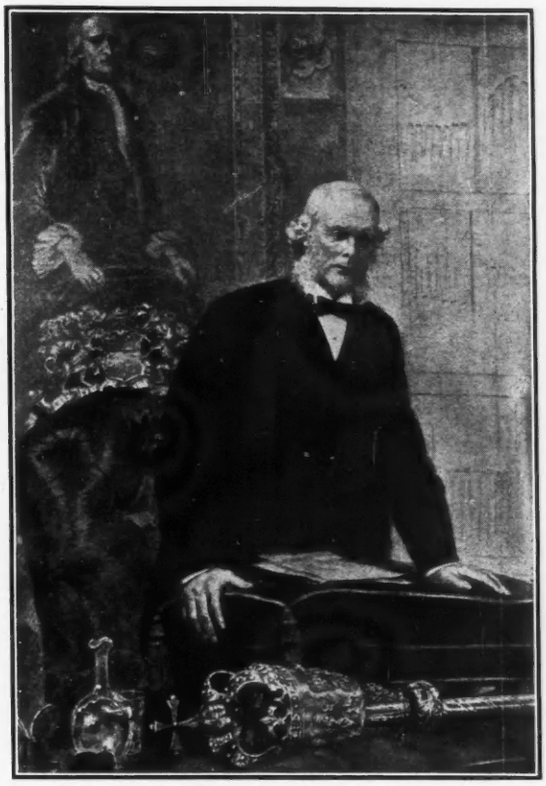

Fig. 4.—Sir Joseph Lister as President of the Royal Society, 1896.
(From Prof. Chiene's "Looking Back")

Returning from this long digression, and to point its moral, we should record that during that first period of his house-surgeonship under Syme at Edinburgh, and his assistant surgeonship to the Infirmary, he continued his original investigations upon the early stages of inflammation as seen in the web of the frog's foot and the bat's wing, and upon coagulation of the blood.

This inborn inclination had been fostered in London by his work in pure physiology and anatomy under Sharpey and Wharton Jones, who taught him technique. And this brings us to the third quality of his mind, namely, that of accuracy and completeness of observation. He not only had the investigative spirit; he acquired also the technical training to make his investigations precise, accurate and fruitful. The qualities of honesty, patience, perseverance and precision were fundamental. They were inbred, but were also strengthened by his Quaker education. Lister continued investigative work throughout his active surgical life, up to the age of sixty-two, when he retired from the professorship at King's College. It was a lifelong habit.

But the investigative spirit, even supported by all these qualities, does not alone make the discoverer of new truths. One thing more was necessary to make him the genius that he was—imagination. It is improbable that Lister ever thought of himself as possessing genius. In 1854, being then twenty-seven years of age, a vacancy occurred on Syme's staff at the Edinburgh Infirmary, and Lister writes thus to his father concerning the wisdom of applying for the post. "Although I must not expect to be a Liston or Syme, still I shall get on. Certain it is I love surgery more and more, and this is one great point; and I believe my judgment is pretty sound, which is another most important point. Also I trust I am honest and a lover of truth, which is perhaps as important as anything. As to brilliant talent I know I do not possess it, but I must try to go as far as I can by perseverance." In these words of his own we have as good a picture of the man as can be drawn, and probably as truthful a one. His judgment of himself, on the whole, was correct. He did not have brilliant talent—that thing which, by mere brilliance, impresses the crowd; but he did have genius, though he never suspected that.

What then, was the nature of his genius? (I apologize; but who has ever been able to resist trying to define "genius"?) The definition with which we are most familiar is "an infinite capacity for taking pains", or, as Carlyle says (with his love of words that are "different"), "a transcendent capacity for taking trouble". But that is not half the matter. The crossing sweeper may take infinite pains to keep his crossing clean. We all know very dull fellows who take infinite pains. No! Imagination first is necessary,—an imagination which from a solid foundation al-

ready acquired leaps from one height to another height; which sees the causal connection between two different spheres of knowledge, and then proceeds to consolidate the ground thus won. If Lister had not had genius he might easily have left Pasteur's researches aside as belonging to pure chemistry, and never have seen the bearing on his own problem of preventing sepsis in wounds. But he saw Pasteur's beacon upon a distant height, and genius was manifested in the immediate imaginative flash of inference—and in action. Clifford Allbutt says in a beautiful phrase, "He was watching on the heights, and he was watching there alone." True! But we must remember that these "heights" were his own, reached by his own hard climbing, far in advance of others; therefore he was "watching there alone".

There are interesting details of the story that bear repeating. For five years he had been Professor of Surgery at Glasgow University, teaching his students that putrescence in wounds was caused by "something" existing in the air. He may have known in a general way of minute organisms in nature; but it nowhere appears that he was acquainted with the accurate observations of Cagniard-Latour, Schwann, Semmelweiss, Pasteur, Lemaire, Davaine and others upon these organisms, or of the discovery of the principles of fermentation of beer and wine by Pasteur, in the second third of the century. Although he was able to read French and German there is very little evidence to show that he was a wide reader. Even Spencer Wells's paper of 1864, reviewing Pasteur's work, he appears to have missed. The cast of his mind was probably similar to that which we find in most research workers who are engaged in special investigations, and who read deeply in the subject which claims their interest, but have no time left for what may be called general reading, that is, general scientific reading. And he was at the time devoting his spare hours to the study of inflammation in its pathological aspects. Up to 1865 Lister does not appear to have had in mind bacteria as a cause of anything in particular, let alone as the cause of suppuration.

At this point, by mere accident, during a walk in the country, his colleague, Anderson, the Professor of Chemistry, tells him casually of Pasteur's work. What was Pasteur's discovery? Briefly it was that fermentation in wine is caused by minute organisms and that putrefaction is a form of fermentation. But the term "putrefaction" in Pasteur's mind referred only to the changes of decomposition in a "putrescible liquid", with the generation of a foul odour. His experiments as recorded concern only the action of bacterial fermentation upon an organic fluid, in a flask, under varying conditions of temperature and the presence or absence of oxygen. It does not appear from Pasteur's writings* that he ever saw clearly a possible application of his discoveries to what we know as surgical infections. Here first comes in Lister's genius, in the quick *imagination* which accepted Pasteur's discovery, not as an hypothesis of a general sort, but as the indubitable explanation of the dark problem of surgical infection. He leapt from the general to the particular. But without the addition of "infinite pains", the idea would have perished of inanition. "Infinite pains", the second half of the definition, was the very essence of Lister's nature and training. It manifested itself in immediate trial, in the appropriate experiment, in action. The thinker who stops at thinking accomplishes very little if anything. Let me quote here a little quatrain written by one of my good friends, a genius himself in business:

> "'Tis action counts; 'tis action wins!
> The dreamer and the thinker
> Are useless tools. They ne'er begin!
> Much better be a tinker!"

Here, indeed, was where Spencer Wells failed. He had made an analysis the year before of Pasteur's discoveries, and had offered the hypothesis that decomposition in wounds might possibly be explained by a similar action of germs. But Spencer Wells was a busy gynæcologist, a clinical surgeon, untrained in the methods of pure science, and strange to its ideals. He lacked the technical training, he lacked the concentration, and he lacked the time and the energy; he could take no "infinite pains", and, finally, he appears to have had no idea of any practical application of Pasteur's discovery in the direction of excluding germs from wounds. He had a spark of genius, to make the guess; but his guess remained a guess. Lister, independently, made the same guess, and then proceeded to transform the guess into a certainty.

From this moment on Lister devoted all his energies to the pursuit of this one great conception, and he published after this very little upon any line of surgical work other than the principle and the details of antisepsis. At that

* Recherches sur la putréfaction, *Comptes rendus de l'Academie des Sciences*, June 28, 1863, **56:** 1189-1194.

time he was just thirty-eight years of age. He had the power of concentration; he could submit himself to the compulsion of an idea; he could lose himself in a great quest; he could press forward towards his goal through all obstructions and discouragements until he reached it. That singleness of purpose, that refusal to diffuse his energies, was also the part of genius.

But we must pass on to mention one other aspect of his intellectual capacity. I refer to his education in the humanities. It is not realized by some how excellent a cultural education Lister had enjoyed. In his times it was not usual for a lad who had chosen medicine as his profession to interpose four years of an Arts education between school and the medical college. Lister took his degree of Bachelor of Arts at University College in 1847, when he was just twenty years of age. He took honours in classics and became a fair Latinist, an accomplishment of which he made good use later. When, in 1869, on the occasion of his being invested with the Professorship of Surgery at Glasgow, he was expected to deliver an inaugural dissertation in Latin, he was able to do so without particular difficulty. In fact, with his usual habit of completing things at the last moment, he wrote several pages of his address on the train, while crossing from Edinburgh to Glasgow, during the two or three hours before the time of the ceremony. That his Latin was quite Ciceronian one may perhaps reasonably doubt. One great advantage, however, of his classical education certainly lay in the facility with which, during his thirties, he acquired a reasonable fluency in French, German and Italian, of which later he made such good use in conversing with the distinguished foreigners who came in numbers to study the antiseptic principle in his wards. And it is also probable that this linguistic capacity had some part in the rapid adoption of the antiseptic system in the various European countries. Many foreigners came to hear his gospel. He spoke to them "each in his own tongue", and the antiseptic evangel was the more easily diffused abroad.

Lister's abilities as a teacher, proclaimed by so many of his students, were quite unusual. His was not the "one, two, three" method, appealing only to the memory—the parrot type of teaching; rather was it based on logic and on induction. Certain phenomena are observed; what can be the cause of such phenomena? What new facts have been, or can be, discovered to explain these phenomena, whether in anatomy, physiology or pathology? It was always a reasoning from cause to effect, and the student was invited both to follow Lister's reasoning, and to reason for himself. But, over and above that, Lister's teaching carried a particular appeal to the ardent, enquiring, and enthusiastic mind of youth in the fact that Lister himself, while still but a very few years older than his hearers, was able through his scientific researches to contribute new knowledge bearing upon the very foundations of surgery. This was totally different from the routine teaching of those days. Never, they thought, had surgeon spoken as did this surgeon. And while this was true in the earlier years of his work as extra-mural teacher in Edinburgh, and in the first five years of his Glasgow period, that is, from about twenty-eight to thirty-eight, when he was putting before his students his new work upon inflammation and the coagulation of the blood, how much more true was it when he was able, from 1865 on, to show forth before their astonished and admiring eyes the great glory of the discovery of the cause of sepsis in wounds, and the greater glory of the effective means of combating it. No wonder his students worshipped him.

Lister possessed that quality of mind, not infrequently absent in geniuses, that enabled him to present to others a logical and sequential account of his own observations and of the processes of his reasoning. In clarity of exposition he was like the French, who have always been past masters in teaching. Moreover, his English style, though not brilliant or arresting, was still perfect for the great purpose of logical statement. His words were grave, serious, and his thought at times lofty and noble, though one would look in vain for the pungent aphorism, the striking antithesis, or the thought-provoking paradox. He had a clear, musical voice; he spoke slowly, so that the student had time to take full notes; and his manner in speaking was suffused with that glow of earnestness, sincerity and enthusiasm for his subject which inevitably excites corresponding sentiments in youth.

Another side of Lister's intellect deserving of comment lies in the relative slowness of his operating. Yet, indeed, this was quite in character. One does after all use the mind as well as the hand in the practice of surgery, though some physicians apparently think otherwise. And in Lister a lesser speed of the hand as compared with other surgeons was actually dictated by a greater speed of the intellect. It was the logical sequence

of his higher mental attainment in the *science* of surgery. But the criticism of slowness, voiced by some colleagues, was natural enough in days when the surgeon's ideal was speed. When the great Fergusson was about to amputate an arm at the shoulder his assistant advised one of the visitors not to wink, else he might miss seeing the operation done. Amputations even at the larger joints were expected to be done within the minute, and a perineal lithotomy inside of two minutes. Myself, when young, did eagerly frequent the course of operations on the cadaver at Freiburg, when Kraske was the young professor there. I remember his saying as he put the long knife into my hand for the amputation at the hip-joint, "Now, remember, not more than sixty seconds!" Lister's answer to the criticism was that, since the advent of anæsthesia, speed was no longer the prime desideratum; rather was it the careful carrying out of a planned operation under the antiseptic principle, with due care for the arrest of hæmorrhage, the avoidance of unnecessary traumatism of the tissues, and the exact application of the antiseptic and the dressing. His principles of operating have received complete confirmation by the development of surgery since his time. We have learnt to prize care above speed. Halsted, with his three hour radical operation for breast cancer, and Cushing, with his four to six hour operations on the brain, are the legitimate disciples of Lister; and their results, like those of Lister, have proved the value of his example.

Lister's scientific cast of mind and his extreme conscientiousness (which was of the heart) are well illustrated in the story of the antiseptic dressings which he devised, and the extraordinary degree of care with which he did his dressings. It was his habit, at any rate for many years, to do the major dressings himself as well on his public as on his private patients. As one of his pupils remarks, he was "the great dresser". His principle was to keep the neighbouring skin continually aseptic by the application of the antiseptic for some little distance around the edges of the wound. And we must confess that when he succeeded, as he did almost regularly, in preventing the entrance of secondary infection into tuberculous abscesses, which it was his practice to incise and drain with a rubber tube for months at a time, he accomplished a marvel of which we later surgeons are not capable. Ambroise Paré said in that famous phrase "I dressed him; God healed him". This has usually been interpreted as an expression of Paré's simple faith in God. Yet may we not believe that this is only half the explanation? Did he not mean also, that, having dressed his patient, he could do nothing to insure the healing of the wound? Infection might supervene, and that, or healing, was the affair of God, in whose hands the matter rested. But one might well say of Lister "il le pansait, et il le guérit".

The unprejudiced mind must conclude that the dominating influence in Lister's life, overshadowing, indeed, even the gentle qualities of his character, was the spirit of investigation. If he had lived in these modern times it is probable that the Rockefeller Foundation would have selected him as a most promising candidate for a full-time University Chair, for Lister was a brilliant experimental surgeon, and, incidentally, a stout defender of what has been so misleadingly called 'vivisection'. He once refused, by the way, a direct request from Queen Victoria to cast his influence on the side of the antivivisectionists, and that was not long after he had operated upon the Queen. This aspect of his life-work has been described particularly by Bulloch, Sherrington, Muir, John Fraser, and others. John Hunter, in point of time, was the real founder of the experimental method, but Lister was also a founder, worthy to be put by Hunter's side. They were both inductive philosophers who realized that the *art* of surgery was not enough and that experiment was needed in order to establish the *science* of surgery. They both possessed that kind of intellect which is capable of seeing not only the problem to be solved but the appropriate experiment which is most likely to solve it. While Lister's experiments were confined to a much narrower range of subject than John Hunter's, who was in Medicine a sort of universal genius, they were, nevertheless, extremely numerous, varied, and painstaking. Before him the pride of a surgeon was to know his anatomy. But that still left the surgeon open to the charge of being but little above the carpenter, the worker with his hands. The physician of those older days clung firmly to that view and treated the surgeon accordingly. Surgeons of our day who realize that it was Lister chiefly who changed all that will revere him the more. In the striking phrase of von Mikulicz, Lister "was the first to give joy to the surgeon". But he did much more. He made *both* experimental surgery and human surgery safe. He made it possible—one small example—for Moynihan to coin the reveal-

ing phrase "pathology of the living". I need not labour the argument; you all know the results; you are all familiar with the enormous amount of new knowledge that has been gained, not only for surgery but also for general medicine, for pathology, bacteriology, for modern endocrinology, biological chemistry, and even for anatomy itself. Lister found surgery an art; he left it both art and science.

LISTER'S CHARACTER

Lister was born a Quaker, of Yorkshire stock, and he was born into "a house of culture, high thinking and easy circumstances". He chose his parents well. His father was a wealthy wine and spirit merchant, but was a self-taught scientist besides, who won fame by his inventions in optics; and all through life he was the close companion, confidant and counsellor of his son. Lister, through his parents' generosity, never knew poverty, even distantly. He could marry when his time came, and buy a house to live in; he could rent an extramural lecture room; he could always purchase whatever he wanted in instruments, apparatus, and equipment. He of all the Infirmary staff drove the finest pair of horses. He could travel at will. He could take frequent holidays. Was there any obverse to this medal? We can hardly discover it, unless one should count as such the long London opposition to his Antiseptic Principle, with its frequently bitter attacks upon himself. But these he suffered with sadness, not with fear. Fear, which is the most devastating thing in the world, the root cause of most unhappiness in some form or other, was spared to him all his life. He loved his chosen work. He married the woman of his choice, and she was a jewel of great price. And he was a strikingly handsome man. The fickle Goddess, moreover, looked kindly upon him. One man died in the Crimea, to give him the vacancy on the Infirmary staff which was the opening of his career. In short, heredity, environment, and Dame Fortune conspired to smooth his way. But he was worthy of it. His native character withstood all these advantages, and there was no adversity to warp it. He never became spoiled.

That native character was of the most admirable and most lovable,—"admirable" in the sense of exciting admiration in others, and "admiration" including the added Latin meaning of wonder. "Lovable" is perhaps, after all, not quite the right word. He was undoubtedly loved by his wife and a few others; but the word "lovable" indicates surely intimacy; and, apart from the very few, Lister was not intimate, either with friends or with his assistants and pupils. I speak under correction, but that is the impression I gain from the published records of his life. Godlee, Watson Cheyne, StClair Thomson, Hector Cameron, and John Stewart, all his assistants, were certainly intimates, yet only as between youth and maturity. He inspired admiration, deep respect, one-sided affection, a species of adoration or hero-worship, even perhaps a true feeling of love among students, dressers, clerks, assistants and ordinary friends. Perhaps the feeling of love, mixed with adoration, was strongest among his patients, to whom he gave always of his best, in care and kindness and sympathy, not grudging time nor labour.

> "His wise, rare smile is sweet with certainties,
> And seems in all his patients to compel
> Such love and faith as failure cannot quell."

But on his side it was still but a loving pity. Indeed the very qualities of his mind and heart, his deep absorption and concentration, his gravity, his idealism, both in science and in behaviour, his inherent loftiness of view, even his innate simplicity deeply tinged by religious feeling, carried with them their own difficulties in the way of genial human companionship. From his youth he was a man set somewhat apart and above; not by reason of any feeling of superiority in himself, but because of that high and serious outlook that was an integral part of his character. He was sought by others; he did not seek others. His was the type that concentrates affection on wife and child and a very few friends, although always courteous and considerate towards people in general.

But let those who knew him best tell you what manner of man he was. During his student days in London, a cousin, one of his fellow lodgers, described him as "kind and considerate, but rather dwelling apart, and not making any strong friendship with his fellow students".

StClair Thomson writes: "What was the personality of this master of surgery? He was tall, upright, well-knit, stoutly built, deep chested; his bearing was dignified, and his manner restrained, courteous, and considerate. His voice was low and musical, but a trifling hesitation in his speech had persisted from childhood. It was very transitory and never embarrassing. Some thought that the extra effort and emphasis re-

quired in overcoming this occasional stammer added a little charm to his speech, but he himself was very conscious of it, and referred to it as 'a severe thorn in the flesh'. His manner had a certain aloofness about it. His lifelong disciple, Watson Cheyne, confesses that Lister always inspired him with a certain sense of awe. I myself felt that his soul was 'like a star and dwelt apart'. I can only say that no teacher, no friend, no man I have ever known has left his impress on me as Lister has done. To none of them do I feel the debt I owe to him, for the example of his veracity of thought and word, his patience and constancy in the pursuit of truth, his eagerness to instruct his pupils, his long-suffering with stupidity, his tenderness to the poor, and his gentleness to the sick and maimed."

Watson Cheyne says that in spite of his long and close association as house surgeon and private assistant he never entered Lister's presence without a feeling of awe. Bulloch says of him, and he only repeats in essence what many others have said, "No one could come into contact with Lister without being impressed by his noble personality, his magnanimity, his liberality, and his modesty. His aims were of the loftiest kind, and probably no medical man kept more steadfastly before his gaze the covenants of the Hippocratic Oath. He venerated his teachers, he taught his art to his pupils, he kept nothing secret from his profession, and followed that system which, according to his ability and judgment, he deemed best in the interest of his patients. With purity and holiness he passed his life and practised his art."

Sir William Macewen says: "We students were all very much impressed by the personality of Lister. His mild expression and his grave demeanour gave him benign dignity which could not fail to command respect." And Leeson says: "In spite of his attractive charm he seemed to us to be surrounded by an atmosphere of indefinable separateness, which forbade familiar approach, and which neither time could bridge nor custom abate—just a tinge of geniality would have made so much difference." This was said at a time when Lister was in the middle forties.

But this is not the whole picture. Among his friends of an evening, at his house, he was always the genial host, his sole object being to make his friends happy. John Stewart tells us this, and he adds—"All who have any recollection of that circle of friends know that their merriment was both hearty and wholesome; at times his fun and merriment were like that of a boy."

LISTER'S RELIGION

There is no doubt that Lister was a genuinely religious man, with a quiet and strong faith in God, although he rarely gave utterance to such convictions. This was natural to his temper and to his Quaker upbringing. But he left home for London at seventeen to study the humanities and medicine; and his horizon, mental and spiritual, must have widened under the influence of association with very able minds. At the age of twenty-six he went up to Edinburgh, and was soon busy as Syme's house surgeon in the wards. Now the care of the sick poor does broaden the mind in matters religious; every ward-round shows forth the brotherhood of man in suffering; dogma loses its force, and sectarianism becomes ugly. When Lister fell in love with the daughter of his chief, Agnes Syme, and was faced, upon marriage, with the necessity of breaking away from the Society of Friends, I do believe that the decision caused him not a moment's hesitation. He could quote and subscribe heartily to one of their own statements of belief, that "true religion stands neither in forms nor in the formal absence of forms". He joined his wife's church, the Episcopal Church of Scotland, and was quietly content. Never does he appear to have been disturbed by that wave of philosophic doubt which overran England in the last half of the 19th Century. In his published letters we do not find even mention of the names of Wallace, Darwin, Huxley, or Spencer. His mind, after all, was simple, direct, and above all practical. He was obsessed by his own great problem in science, and his heart found full satisfaction in the care of his patients. What need to trouble himself with "the conflict between science and religion"! When well on in years this question was once put to him, and his answer was that he had "found nothing in science to contradict the verities of religion". Formal confession of his faith in public, or even in conversation, was unnecessary and probably distasteful. The care of the sick was practical religion. To students he spoke of "our sacred calling", "this fleshly tabernacle", "this piece of divine mechanism"; and once rebuked stifled laughter among students in the operating room, saying, "Gentlemen, remember where you are!" The Latin word *religio* signifies fundamentally the condition of being "tied" or "bound", that is, by a sense of duty or

obligation. That was Lister's real religion, more so than attendance at divine worship; for he was ever bound by the consciousness of his duty in all things.

LISTER'S SENSE OF HUMOUR

It is to be doubted if the quality of humour and even, perhaps, of wit is to be found in any of the men whom history has called great. In such characters familiarity, levity, jest, the merry quip and crank, jokes of any sort, all indeed that makes for the pleasure of a genial and clever gaiety among average humans, is wanting. Good-humour and cheerfulness may be in them, but not what we regard as humour and wit. If we think, for example, of Homer, Dante, Milton, Napoleon, Helmholtz, Pasteur, Koch, Lister, can we imagine any of them being genial or cracking jokes? These all belong to the obsessional class of the modern psychologist; and it is a modern psychologist whose judgment, given me in conversation, was that Joseph Lister belonged to the obsessional type. Such men are characterized by an absorption in one subject, capacity for concentration, and a gift for detail of practically abnormal degree. Inventors and discoverers are of this class. Edison, when once asked what was the secret of his having hit upon one of his inventions, replied "by constantly thinking of it". In fiction, Arrowsmith is the type; in real life, Pasteur and Lister are examples. The pursuit of truth possesses them. Small wonder if such have neither capacity for nor inclination towards that lighter thing which we call humour; they are not 'jokey', to use the Scotch phrase. The very attitude of their minds can see nothing in exaggeration, extravagance of statement, burlesque, save a sort of untruth; and wild extravagance is the core of at least one form of humour. Still less do such minds see in irony or sarcasm, for that, too, bears the impress of unveracity, besides being ungentle; while such vulgar humour as horseplay is entirely foreign to that natural dignity which goes with intellectual simplicity. And I fancy that the "remoteness" of which Leeson speaks was due as much to a lack of humour in Lister's composition as to his idealism, for I cannot avoid the conclusion that Lister had little, if any, sense of humour. Many of his biographers have said that he was "humorous". John Stewart wrote "that at times his fun and merriment were like that of a boy". Exactly! But boyish fun is good-humour, not humour. And, besides, such fun and merriment belonged only to his home circle. At the hospital and in public he was grave. Leeson, his clerk and house surgeon, records that he never saw Lister laugh. That familiarity and gay geniality among the crowd which makes for popularity was not his.

Perhaps I can best illustrate my meaning by a few examples culled chiefly from Godlee's Life. A man's reading indicates the cast of his mind. Lister's favourite books were the Bible, Shakespeare, Horace, Milton, Dante and Goethe, and "he would repeat '*ore rotundo*', from memory for the entertainment of friends, long passages from these authors". May one not suggest that this last quality (*ore rotundo*, I mean) is incompatible with a sense of humour?

The only examples of Lister's humour that I find recorded rise no higher than the simple pun. To be exact, there are three of them, and they are worth relating, if merely as negative evidence. (I quote John Stewart.) In demonstrating to his class the discoloration of gangrene, he would say "it has 'gaen green' ". "One day when his instrument clerk had omitted to put a probe in the tray Lister looked at us gravely, but with a twinkle in his eye, and said, 'Watson has been very *improbus* as regards that probe'." Alluding to his preference for chloroform over ether for an anæsthetic, he would quote "How happy could I be with 'ether' were t'other dear charmer away".

He is said to have been shy; but shyness again is incompatible with a sense of humour. For shyness is a form of self-consciousness, congenital and involuntary, if you like, but still self-consciousness, whereas humour is not self-conscious. It is human to make comparisons, nor are these always odious; and in this matter of humour the comparison with Osler comes naturally to mind. Both by the common judgment were great, but the qualities of their greatness were not similar. Lister had a genius for discovery in the realm of knowledge of which Osler had comparatively little. Osler had a genius for human fellowship which Lister had not. Lister's circle of close personal friends was narrow, while Osler's was almost limitless. Lister was shy and lacked humour, while the genial unself-conscious Osler was full of it.

Perhaps it is in a man's intimate letters that humour most naturally appears. I have gone over all Lister's letters in Godlee's book, and there are not a few. They are all written in excellent, if somewhat stilted, English; they are

gentle, kindly, reflective, informative, cataloguey, and (except when they discuss his surgical and experimental work) rather dull. No touch of lightness enlivens his pages. I shall quote only one or two examples.—He is writing about Tennyson's "Queen Mary", which occupied him all the way from London to Edinburgh, and he says: "The mere fact that it was so engrossing is a proof to me that it is no common dramatic production; it certainly comes nearest to Shakespeare of any English play other than S's that I have read, as regards the naturalness of the characters and the manner in which the parts are sustained."

Describing a holiday with his wife in Norway, when they climbed a mountain, intending to take lunch at a dairy-house on an upland pasture, he tells his brother of it in these words: The guide "placed on a table before us two large wooden vessels, one containing fresh milk, the other sour milk where *bacterium lactis* seemed to have done its work very purely, while *oidium lactis* bloomed over the surface of the cream. Three great wooden spoons, one for each of us and one for the boatman, would have been all the utensils for availing ourselves of this provision, had it not been for an earthen cup with wild raspberries which we had bought of a boy at the head of the fjord, and which served for a dish for Agnes and myself to eat the soft, solid, sour milk from, while the boatman helped himself direct from the wooden milk pan. This soured milk seems to be a very important article of diet with the Norwegians, and to a hungry and thirsty mortal is wonderfully acceptable and refreshing. We added to it some Peak and Frean's biscuits, which we had taken from the hotel, while our boatman chewed alternately soft flat bröd (flat bread) (a sort of thin oat-cake, though made often of barley and rye rather than oatmeal) and slices of a loaf of black rye bread, which provision he had taken the precaution to bring with him. The wild raspberries and a good draught of fresh milk completed what proved a most sustaining meal. Having deposited a krone (1-1/9th shilling) on the table by our guide's directions, to pay for our repast, we took to our boat again . . ." and so on. There is much more of it in the same style. One would like to hear Agnes's account of this expedition.

Let me add but one more instance. In lecturing to his students concerning the technique of dilating urethral strictures, he used to say (we have it from Leeson) "No difficult stricture should ever be attempted unless the surgeon felt quite fit, and, for example, had had his bowels open that morning. Any little disharmony of his functions might detract from his delicacy of touch and lead to failure."

To those of us who never knew Lister this description of his character and spirit might well suffice, but the student of his life is inevitably tempted to further analysis. Lister was human and had his foibles; and to say a word about them is to do him service, for absolute perfection is annoying. But they were not serious! Almost disappointingly not serious!

His passion for precision, his extreme attention to detail, and his profound absorption in his subject resulted in what one might characterize as a certain degree of self-centredness, of which he himself was naturally unconscious. This showed itself, for instance, in taking a disproportionate amount of time in reading his papers before medical meetings to the disappointment of others on the program. Godlee tells us that at a meeting of the British Medical Association Lister began his paper in the afternoon session at two o'clock and only finished at half-past four, leaving half an hour for five others. In Edinburgh he took two hours; in Philadelphia two and a half hours, with a further hour in discussion.

One may say also that his notorious unpunctuality implied a lack of consideration. Unpunctuality is a thing most reprehensible. Is it really a valid excuse that Godlee offers, when he tells us that Lister was always at work upon the subject of his paper until the last moment, seeking final verification? The story is told that on one occasion, being actually on his way to deliver a paper on coagulation of the blood, a thought occurred to him and he stopped at a butcher's, had an animal killed, verified a dubious fact, and then proceeded on his way, arriving late. He was often late through kindness to patients. On his road home, we are told, he would drop in at his nursing home, and, finding a patient complaining of the dressing being uncomfortable, would forthwith remove his coat, and change the dressing (a long process) entirely oblivious of his consulting room full of irate patients, with their doctors, all vowing they would never consult him again. A misplaced kindness! Anyhow, he was apt to be late. Shall we say—yes, we will say—that this was the frailty of a noble mind.

With all Lister's modesty there is no doubt that he was normally ambitious, taking a great

pleasure in the esteem and admiration of his fellow men, eager for advancement in his university career. In 1864, at the age of thirty-seven, he applied for the Chair of Systematic Surgery in Edinburgh, but failed, against an older rival, Spence, by the margin of one vote. His modesty was not so great as to save him from a severe disappointment. In 1866, being not yet forty, a vacancy occurred at University College, London. Lister applied "with hope, indeed almost with confidence". But John Marshall, who had served an eighteen years' apprenticeship as Assistant Surgeon to the Hospital, and so had "great claims on the Chair" was elected. The news of the defeat "affected" Lister keenly. He writes "The disappointment was at first extremely severe". Godlee adds that "after a bad night and some philosophical meditations" he was able to go to the Infirmary next day in so cheerful a frame of mind that his house surgeon, who expected to hear the news of his appointment, inferred from his face that he had been successful. Lister concludes a letter to his father with the words: "At least this (Glasgow) is a noble field of labour. And I am sure the canvass is in no way to be regretted on my account. Any effect it has had can only have been to bring me more into notice. And if another opening should occur in London, I have at least declared my willingness to go there, and perhaps paved the way for going."

He was sadly open also to minor discouragements, such as the smallness of his class in the early days at Edinburgh, or in the later days at King's College. For instance, according to Wrench, he "used to hang his head when driving down to King's at the thought of devoting himself to the convincing of a handful of apathetic students of the value of a system which he believed was revolutionizing the world's surgery".

Yet underneath this he did possess an essential simplicity and modesty, and I should like to relate in illustration a pleasant incident (the story of which I owe to our Editor, Dr. A. G. Nicholls) which occurred during his visit to Montreal in 1897.

On their return from a visit to California Sir Joseph Lister (as he then was) and Sir Michael Foster passed through Montreal and were asked to address the medical students of McGill University at the commencement of the session. Lister's text on that occasion was "Take no thought for the morrow". The burden of his address was that one should only concern himself with performing well the daily task—a dictum of Osler's also, by the way. I must content myself with paraphrasing Lister's words. He said, "In the subject of anatomy I performed the daily dissections, read the textbook, and covered the various topics as they arose. When the examinations came I passed easily—in fact, I was first. In physiology I followed the appropriate experiments and studied the prescribed texts from day to day. When the examinations came I passed easily—in fact, I was first". He then cited several other subjects, always concluding "When the examinations came, I passed easily—in fact, I was first". It suddenly dawned on him that he might be accused of boasting. There was a dramatic pause. The speaker flushed scarlet and then said, "Gentlemen, I am an old fool to be talking to you this way". The effect was electrical. The students jumped up on their seats, waved their handkerchiefs, and cheered him for several minutes.

In short he had the foibles of most normal men. One records such imperfections with a certain sense of relief; for indeed spotless perfection is, *à la longue*, somewhat aggravating.

One likes to see a man and see him whole. To my mind, the character of Lister loses nothing essential because of the fact that he lacked humour and geniality. The real beauty of his character in its qualities of pity and tenderness for the sick, its nobility of purpose, its faithfulness to high ideals; the magnificent strength of his intellect, harnessed and driven without rest and without haste towards a goal which both heart and mind told him was the supreme thing in life and of almost inconceivable benefit to his fellow-beings; and, finally, his unquestioned possession of genius—these all remain for our blessing and for the blessing of all who come after us through the ages.

LISTER'S WIFE

In 1856 Lister married Agnes Syme, the eldest daughter of the Professor of Surgery at Edinburgh. Possessing as he did an ample allowance from his father, or possibly means in his own right, he was never troubled by *res angusta domi*. Poverty never came near the door, nor did love ever fly out at the window. The union was never blessed with children, which may have been a fortunate thing from the standpoint of his great work, for Lister undoubtedly as a father would have been as conscientious and as generous of his time in the education of his children as he

was in every other duty. And if Agnes Lister had had as many children as Joseph Lister had brothers and sisters, namely seven, she could hardly have mothered such a brood and at the same time been Joseph's invaluable secretary. As it was, it can be said that Agnes Lister devoted all her energies to the career of her husband. It could not be said of Lister "A young man married is a man that's marred". Rather might one quote:

> "He is the half part of a blessed man,
> Left to be finished by such as she;
> And she a fair divided excellence,
> Whose fulness of perfection lies in him."

Yet it is curious how little is said of her by Lister's biographers. We read, it is true, the oft-repeated tale of her wifely devotion in general, and in particular as his amanuensis. She sat by his side through all those "glorious nights" over the microscope, and her task was to write legibly in his big commonplace books the notes of his observations as he dictated them. The enormous number of these notes attest alike her faithfulness and her physical endurance. But after that, almost nothing. Stephen Paget waxes indignant over it. "It is so easy (he says) over the writing of biographies to put asunder those whom God has joined together. Mostly it is the wife who suffers. She was the very making of him, and she is dismissed as nothing more than a circumstance of his life. But where would he have been, and what could he have done, without her? One feels that Paget is right. She made his subject her own; and one may wonder whether there was not much of her own ingenuity that went into the devising of his physiological and bacteriological apparatus, and perhaps not a little towards the framing of his English style.

Fig. 5.—This picture dates from about the time of her marriage.

In Godlee's Life, which is much the fullest, we find only six of her letters, and in all the letters of Lister himself that appear in that book there is but scant reference to his wife. One must imagine that, though her help in his life was fully recognized, her other qualities were neglected. We get glimpses of her character in a few letters of Dr. John Brown, the author of "Rab and his Friends", with whom Agnes was a great favourite. At their marriage, John Brown proposed a toast to the young couple. "Contemplating their future, and looking back upon a childish illness of hers which involved several days of complete unconsciousness, he said,—'Lister is one who I believe will go to the very top of his profession, and as for Agnes, she was once in Heaven for three or four days, when she was a very little child, and she has borne the mark of it ever since'." In 1869, when Lister was about to return from Glasgow to Edinburgh, he says in a letter to Lister "Give Agnes my love. I like to think of her coming back again, the same unspoiled, quiet, faithful creature that she went."

Yet she had humour and vivacity, as we can see in the few letters of hers that are given by Godlee. When they were on their honeymoon they visited Vienna, and were invited to supper by Rokitansky. After describing the "powerful salted ham, the roast goose, the French beans dressed in something very sour, cheese and cucumber, the rye bread and beer", she ends with a light touch of which Joseph never would have been capable,—"But the supper itself was not so remarkable as was the Germans' enjoyment of it."

Then there was her letter describing the preparation of Lister's first paper in Edinburgh before the Medical Society in 1858. Lister's papers were rarely finished before the last moment, and often not then. —"We had a great drive at the end.

When we went to dinner the paper was in a most incomplete state, and it required considerable exercise of faith to believe that an hour's more work could bring it nearly to a close. However, about seven, we resumed our labours, and how we did work! Joseph's dictating was really wonderful—keeping me writing as fast as I possibly could, and the sentences flowing out so smoothly, hardly a word having to be altered. About half-past seven, we sent for Mr. Craig, whom I have mentioned in a former letter as assisting Joseph. He was fortunately disengaged, and came speedily. Joseph, still keeping my pen fully employed, instructed Mr. Craig in the preparation of the *trotters!* (The paper was illustrated by demonstrations of the state of the blood in sheep's feet), and afterwards gave him a quotation from the 'inflammation' paper to copy. At last, at ten minutes past eight, a cab was sent for, a note or two jotted down for a part of the conclusion of the paper, some of it not even noted—and off went Joseph and the manuscript, Mr. Craig and the *trotters* in the cab, and arrived at the George Street Hall just as Dr. Haldane, who had a communication to read before Joseph's, sat down!! So he had only time to take off his greatcoat and at once begin." A rare combination of efficient help and humorous description! Lister, in writing to his father the following day, says that she "wrote for seven hours one day and eight the next, and was most helpful in suggestions as to words and arrangement of sentences". You see the contrast!—Could Lister have written such a letter as the one just quoted? Never!

If one were to give rein to fancy one might imagine vain things—a few! Did she never rebel inwardly on their holiday jaunts into the country at classifying the flowers and the birds? Did she never long to go to St. James's Hall to hear the divine Patti? Did she ever try to persuade Joseph to read to her, "ore rotundo", long passages from Tam O'Shanter? We are not told: but one hopes she did—occasionally—even if Joseph did not understand. We may be sure that she was a lady of very gracious temper. And how greatly she reminds us of Barrie's Maggie in "What Every Woman Knows". The two women were comparable in their whole-souled subordination of their selves and of their contribution to the finished product of their husband's work. Maggie added to John Shand's able but sober speeches the humorous touches which made them such a success. And she hid it from him. Finally she is exposed and John is shamed. "It's nothing unusual I've done, John. Every man who is high up loves to think that he has done it all himself; and the wife smiles and lets it go at that. It's our only joke. Every woman knows that." Something of the sort, I like to think, was Agnes Lister's contribution to Lister's success. She was the daughter of a very able man, and was used at her father's house to the society of a brilliant coterie of able and witty men; and her letters show great acumen in observation, a pleasant style, and many touches of humour. Would he have reached the topmost heights without her? Perhaps not!

Lister gave up active surgical work, both public and private, at the age of sixty-five. In 1893, after thirty-seven years of ideal companionship, Agnes, his wife, died. He was at first lost without her. But after a while, being made President of the Royal Society, he turned his still clear mind to furthering the cause of Public Health and in particular the development of bacteriology. He took an active part in the enlargement of the Jenner Institute, of which the name, consequently, was changed to the Lister Institute of Preventive Medicine. He visited Montreal and Toronto in 1897, at the age of seventy, being still strong and well. After eighty, his strength gradually failed, and at the age of eighty-five, in the fullness of his years, he found his rest. He could well repeat the words of one of his most ardent German disciples, von Mikulicz, who, on his deathbed at the early age of fifty-five, said, "I have no grudge against life; it is true I have worked hard, but my work has found recognition among my fellows". Such, I think, would have been the simple modest words that it would have pleased him to say, but nothing more. I suppose that no one of our profession has ever received so universal, so profound, and so heart-moving expressions of admiration,—indeed of worship—from all peoples of this world as did Lister. He could say his Nunc Dimittis with humility, yet with a great and pious content, for he could not but see his own glory of achievement in the relief of suffering and in the saving of lives; and he could not but know that that glory was well-pleasing to the Master in whom he had always trusted. He had, in truth, ministered to "the least of these" and to the greatest. He could go to his rest in quiet, for "Truth hath a quiet breast".

. . . . . "He gave
His body to that pleasant country's earth
And his pure soul unto his Captain, Christ,
Under whose colours he had fought so long."

To gather knowledge and to find out new knowledge is the noblest occupation of the phy-

sician; to apply that knowledge with understanding to the relief of human suffering is his loveliest occupation; and to do both with an unassuming faithfulness, sets the seal upon the whole. Of that quality was Joseph Lister.

I am indebted to the following companies for permission to republish the illustrations: Figs. 1 and 2, the Macmillan Company of London (from Godlee's Lord Lister); Fig. 3, Wm. Green & Sons, Edinburgh; Fig. 4, Oliver & Boyd, Edinburgh; Fig. 5, Baillière, Tindall and Cox, London.

THE RADIOLOGICAL TREATMENT OF CANCER

1929 – 1935

IV. CARCINOMA OF THE LIPS*

BY G. E. RICHARDS, M.D., F.R.C.P.(C.),

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BY this title it is not intended to indicate that all of the cases here reported have been treated exclusively by radiological methods, but rather that the paper is a critical analysis of the results of treatment in a group of cases in one field of cancer in which radiological methods have played a prominent part, and the study should indicate fairly acurately the respects in which these methods have proved successful and may be considered satisfactory, and also point out their limitations. Certain cases have been treated by surgical measures, and where this has been the case the details are recorded. Finally, an attempt will be made to reach a conclusion as to those phases of this aspect of the cancer problem in which the best results may be obtained with the least risk to the patient by radiological methods alone, surgery alone, or a combination of both methods.

The work has been carried out by a group representing both surgery and radiology, organized in 1924 to study jointly the treatment of oral cancer. During the years 1924 to 1928, while the work done was of benefit to the patients, limitations of secretarial and social service staff resulted in follow-up records which are not sufficiently accurate for statistical study, and these have been discarded for the present purpose, which covers the years 1929 to 1935. In the majority of the cases the patients have been seen by members of both groups before treatment, and followed jointly after treatment. This has not always been possible in dealing with simple cases, but in all instances the histories have been scrutinized by both groups, and where statements of fact are made they have been verified and agreed to by both.

It should be clear from the title that the purpose of the present papers is to place on record the *results* of treatment as they are being obtained at this centre. Limitations of space have made it necessary to omit many items of clinical interest and to curtail others.

MATERIAL

The material for study consists of 335 cases of malignant disease of the lips of which one was sarcoma and the remainder carcinoma. All patients who had previously received treatment of any sort elsewhere, together with post-operative recurrences, have been excluded, in order to study the results which have been obtained in uncomplicated cases. With these two exceptions all other cases are included in the report, whether early or late.

Of the total 10 were in female patients. Six of the lesions involved the upper lip. The ages ranged from 20 to 95 years. As a matter of added interest, the youngest was also a female patient who suffered as well from generalized lupus erythematosus, from which she died one year after her lip cancer had been controlled, and without recurrence of it.

According to decades the cases are shown in Table I.

* The previous articles of this series appear in the *Journal*, 1936, **35**: 299, 381 and 385.

TABLE I.

20-29	2	60-69	91
30-39	17	70-79	91
40-49	37	80-89	18
50-59	73	90-99	1
Age not given	4		

CLASSIFICATION

Various methods of classifying cancer of the lip are obviously possible, and several have been suggested, either on a clinical basis or on a system of measurement. Some lesions tend to project *from* the surface of the lip and to develop by proliferation, which may in certain cases proceed very slowly with marked corneous characteristics, or in others rapidly result in a soft fleshy mass which bleeds easily and early becomes complicated by ulceration and secondary infection. Such cases in either case may readily be classified by a system of measurement, but duration and rate of development are also of extreme importance.

Other lesions again tend to develop downwards *into* the lip, resulting in an infiltrating mass within the substance of the lip, finally replacing and destroying considerable tissue and causing marked disfigurement. Such cases are more difficult to record by simple measurement.

Naturally, the presence or absence of glandular metastases is a factor of vital importance and very materially affects the ultimate cure rate. A classification could be arranged upon this basis.

In practice it has been the general experience that the treatment of the primary lesion and that of regional metastases present different problems and should be considered separately.

Figs. 1 to 4.—Epidermoid carcinoma.

Accordingly, it was felt that to attempt to combine into a single classification all of the variations and possible combinations of both would only confuse, rather than clarify, the subject. They have therefore been classified separately, and will be dealt with as separate subjects throughout the paper.

THE PRIMARY LESION

Classification. — The classification here used takes into consideration not only the size, bulk and duration of the lesion but also its location on the lip, since a moderately small lesion which crosses the midline and involves portions of both sides of the lip has greater potentialities for trouble than a lesion of similar size entirely limited to either half.

Four groups or stages have been recognized as follows:

STAGE I.—In this group of 248 cases were included lesions measuring up to 1.5 cm. in diameter, entirely contained in either half of the lip. The lesion may be of either a slightly raised, wart-like proliferative type, developing upwards from the surface, or a superficial ulceration spreading along the mucous membrane or slightly infiltrating the substance of the lip. A typical example is shown in Fig. 1, an epidermoid carcinoma of 6 weeks' duration. No glands palpable.

STAGE II.—Lesions measuring 1.5 to 3 cm. still confined to one side of the lip. Such lesions are simply extensions in all directions of those described as stage I. There were 61 such cases. Illustrated by Fig. 2, an epidermoid carcinoma of 2 weeks' duration. No glands palpable.

STAGE III.—Lesions larger than 3 cm., but still limited to one side of the lip, or a smaller lesion situated in such a position as to cross the midline and involve portions of both sides of the lip. Illustrated in Fig. 3, an epidermoid carcinoma of 18 months' duration, with no glands palpable. Lesions of such size are almost invariably accompanied by much ulceration and secondary infection, both of which have an important bearing upon the methods used in treatment, as well as on the prognosis. There were 20 such cases.

STAGE IV.—Lesions involving the entire lip. Invariably very advanced lesions characterized by bulky, nodular masses infiltrating the whole substance of the lip and accompanied by gross ulceration, secondary infection, and foul purulent discharge. Glandular involvement is the rule, and in the majority of such cases treatment is palliative only, with slight hope of cure. There were 5 such cases. Illustrated in Fig. 4, an epidermoid carcinoma with glands in submental and both submaxillary triangles.

Otherwise expressed, the relative proportions of the various stages in the present series were:

TABLE II.

Stage I.—248 cases	74.0	per cent
Stage II.— 61 cases	18.0	"
Stage III.— 20 cases	6.0	"
Stage IV.— 5 cases	1.4	"
Total... 334 cases		
Sarcoma 1		
335		

DIAGNOSIS

The recognition of a malignant condition, occurring upon the lips should be one of the easiest of diagnoses, since the lesion is constantly in view and very soon attracts the attention of even the least observant of patients. Confusion may arise from long-existing pre-cancerous lesions which are not progressing, but in so far as this affects the advice given the patient this should only result in urging upon him the importance of treatment. While in the pre-malignant stage such lesions are *all* curable, whereas once they have become actually malignant there will always be a small percentage of fatalities.

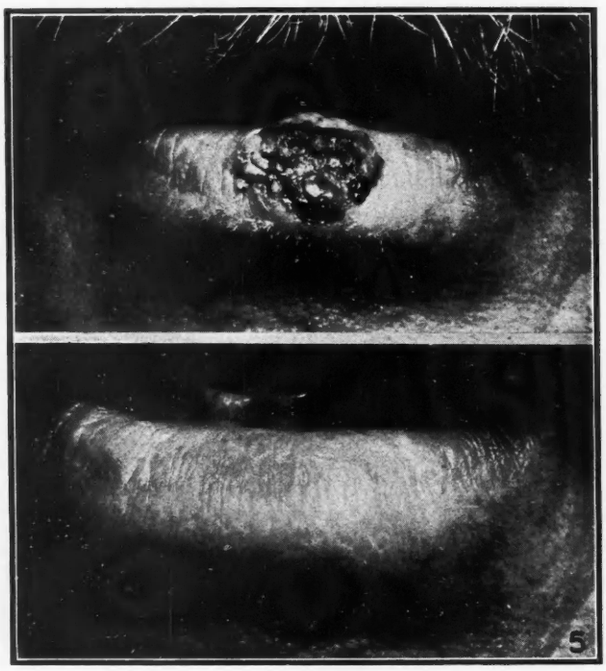


Fig. 5.—The appearance is that of an ordinary epithelioma. Pathological report, fibrosarcoma. Duration 3 months. A satisfactory result from treatment. No recurrence in 1 year.

Differential diagnosis is reduced to a minimum, since there are very few similar lesions to cause confusion. In our experience syphilitic ulceration has not been sufficiently frequent to give rise to any difficulty; there has been one case of tuberculous ulceration which was correctly recognized clinically, and one of sarcoma which was not recognized as sarcoma. This case is shown in Fig. 5. Careful inspection of this photograph fails to reveal any essential differences from the ordinary lip carcinoma or any trustworthy features by which it could be recognized as sarcoma. In spite, however, of the

fact that clinical diagnosis of lip lesions is extremely accurate biopsies are now routinely taken on all ulcerated lesions and usually also on the smaller ones, except in a very occasional patient who objects or on the lip of a female patient, for cosmetic reasons. For this purpose a cataract knife is used, and a very small wedge-shaped fragment is removed so as to include a small margin of normal mucosa or skin.

SECONDARIES—GLANDULAR INVOLVEMENT

Classification. — Glandular involvement was divided originally into three groups, but it was found in reviewing the histories that a fourth had been introduced in those cases in whom there was doubt as to the presence of palpable glands. Accordingly the classification which has been used is as follows:

I. No glands on admission. Includes all cases in which all observers failed to find palpable glands.

II. Questionably enlarged glands. All cases in which there was doubt or disagreement.

III. Glands definitely palpable.

(*a*) Small, discrete, movable, unilateral, operable.

(*b*) Larger, up to the size of olives, still discrete and movable, unilateral, and glands, as described in (*a*), but which are bilateral, operable.

(*c*) Massive glandular involvement, matted and immovable. May be unilateral or bilateral; inoperable.

PATHOLOGY

According to slightly differing systems of nomenclature the cases have been described as epidermoid carcinoma, squamous epithelioma, keratinizing carcinoma, or in an occasional case, without further modification, simply as carcinoma. They have not been "graded".

RESULTS OF TREATMENT OF THE WHOLE GROUP

The results of treatment of the whole group will be presented, followed by details showing the results of treatment of the primary lesion on the one hand and of the secondaries on the other.

Tables III and IV (p. 494) show in brief the general results in all the cases, arranged according to the stage of the disease. From this it will be seen that of the total of 334 cases of carcinoma, 20, or 5.9 per cent, have died of cancer (one of these cases died of "cancer of the stomach" without recurrence of his lip cancer, but as there was no autopsy he is included here in case it might have been an abdominal metastasis). Twenty other patients have died of various intercurrent diseases without recurrence of their lip cancers. This is 5.9 per cent, which is not surprising having regard to the age-groups of the majority of the patients

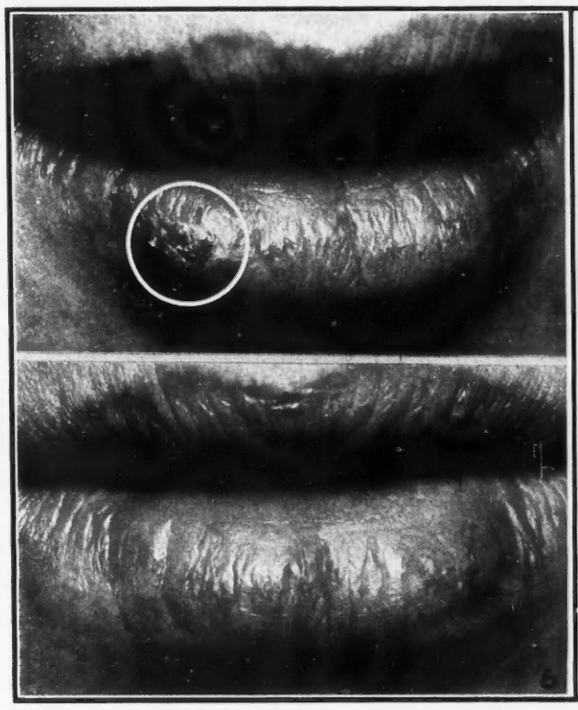


Fig. 6.—Epidermoid carcinoma. Male patient, aged 20. There had been a recurring sore at this point for from 1 to 2 years. No glands palpable.

Fig. 7.—Epidermoid carcinoma. Female patient, aged 20. Satisfactory healing was obtained with some scarring. Duration of this lesion, 1 year.

treated. Thirty-five patients are "untraced", *i.e.*, no accurate information has been obtained regarding the result of treatment. But of these 27 were Stage I cases in which recurrences are uncommon, and it is at least probable that most of them have not reported back because their lesions are healed. None of the "untraced" cases have been registered as "dead" in the Department of Vital Statistics of Ontario.

The one case of sarcoma healed without recurrence, and will not be followed further in this report.

TABLE III.

TOTAL RESULTS

Stage	*Total cases*	*Alive and well*	*Alive with recurrence*	*Died of disease*	*Died of extraneous disease*	*Untraced*
"A"	248	204	3	3	10	27
"B"	61	37	2	6	9	7
"C"	20	7	1	8	1	1
"D"	5	2	–	3	–	–
Total....	334	250	6	20	20	35
Sarcoma..	1	1				
Operative deaths..				3		

If the table were prepared showing only those cases in which the result is accurately known, it would be as follows:

TABLE IV.

TOTAL RESULTS IN KNOWN CASES

Stage	*Total cases*	*Alive and well*	*Percentage*	*Died of disease*	*Percentage*	*Died of extraneous disease*	*Percentage*
"A"	221	204	93.0	3	1.4	10	4.6
"B"	54	37	67.9	6	11.3	9	16.9
"C"	19	7	36.0	8	47.4	1	4.9
"D"	5	2	40.0	3	60.0	..	..
Total..	299	250	84.4	20	6.9	20	6.9
Operative deaths				3			

Causes of failure—whole group.—In reviewing the causes of failure one is impressed with the fact that in too many cases the failure was due to lack of proper cooperation from the patient. Several patients declined to submit to the operative procedures which were necessary to a cure; others following the first treatment failed to return for follow-up as instructed. This is occasionally due to lack of confidence, sometimes to the expense involved, but in all such cases the resulting delay has been disastrous, and subsequent attempts at treatment have usually failed. Very gradually this situation is improving.

The causes of failure are shown in detail in Table VI but in summarized form are as follows:

TABLE V.

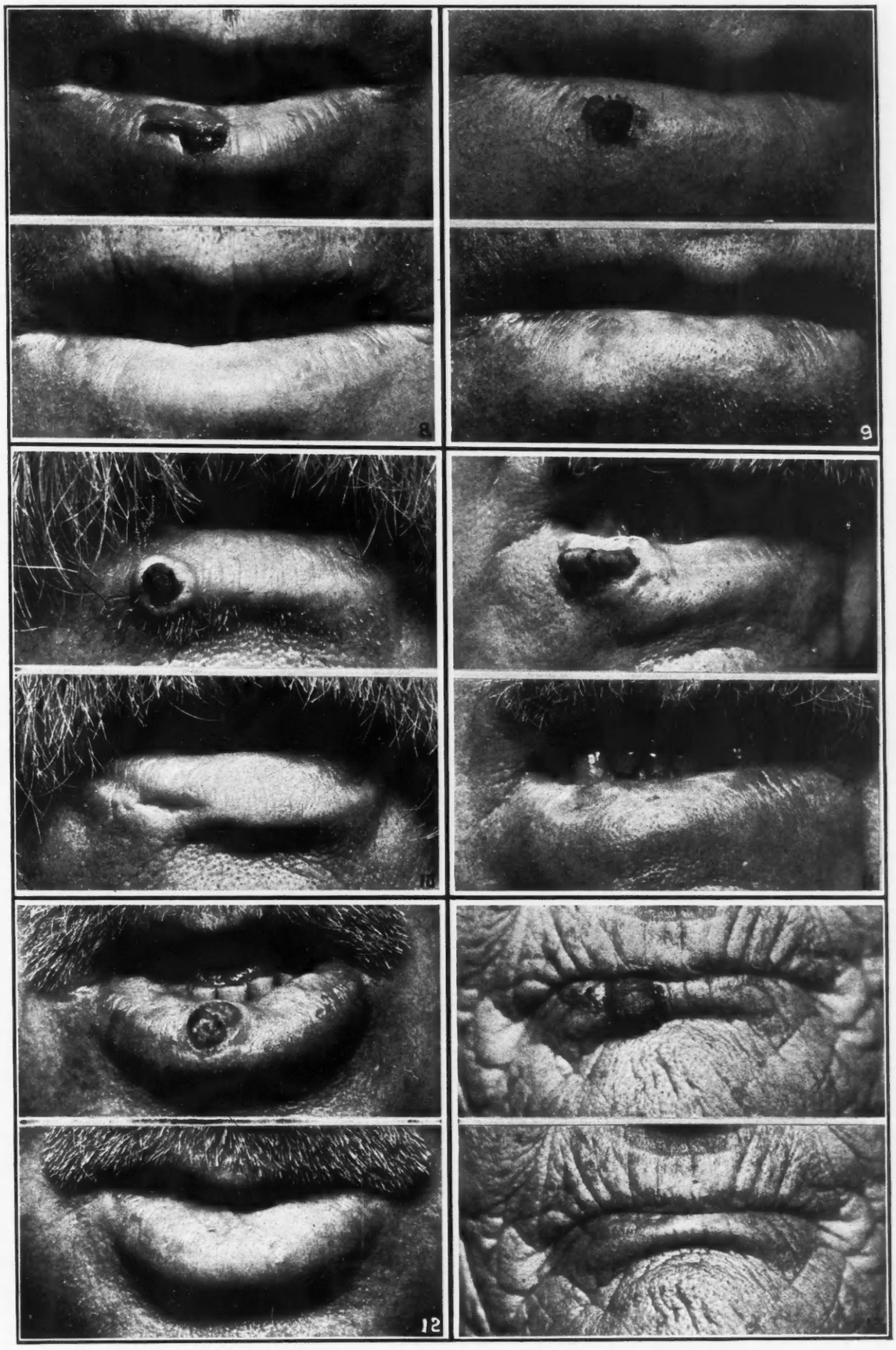
Failure to control primary	3
Failure to control glands	6
Failure to control both	4
Remote metastases	4
Operative deaths	3
Information, not exact	3
	23

RESULTS OF TREATMENT OF THE PRIMARY LESION

The primary lesions in the series included in this report have been treated exclusively by radiological methods. This has included almost the entire range of such methods, from unfiltered x-rays, in some cases, and radium applied on the surface or used interstitially, up to the heaviest form of external irradiation by means of the four-gramme "bomb". The effort has been to individualize the method as much as possible to the requirements of each case. There have been 13 cases in which the treatment failed to control the disease. In 3 primary healing was obtained, but was followed later by recurrence which proved to be uncontrollable by subsequent treatments. The other 10 never healed satisfactorily at any stage, and the final failure was due directly to inability to control the primary lesion.

This represents failure to obtain healing of the primary lesion without recurrence in 3.5 per cent of all cases treated. As the report is not limited to a period in excess of five years but includes cases up to December, 1935, it may well be that some will later show recurrence. The claim is not put forward that these patients are *cured* to the extent of 96.5 per cent but only that disappearance and healing of the primary lesion have been obtained in that percentage.

There has been fairly general agreement that satisfactory healing could be obtained by radium (or radiological methods) in the smaller lesions, such as those included in our stages I and II, but many surgeons have felt that the bulkier lesions should be treated surgically.[1] An analysis of the causes of failure in the treatment of primary lesions in our cases does not support this opinion, and this conclusion finds additional support in the fact that the majority of the



Group A.—Classified as stage I, illustrates various types of lesions and cosmetic results.

TABLE VI.

DEATHS DUE TO THE DISEASE—SHOWING CAUSE OF FAILURE

Stage		
1. "B"	Died of œdema of the larynx a few days following dissection of the neck.	Operative death.
2. "D"	The primary lesion remained healed.	Died from extension of the glands.
3. "C"	Alive and well in March, 1934; died January, 1935.	Recurrence of both primary lesion and glands.
4. "C"	Died without recurrence of primary or secondary lesions.	Mediastinal involvement; remote metastases.
5. "C"	Primary lesion healed.	Extension of glands.
6. "A"	Treated in April, 1931; alive and well in May, 1932; died April, 1933—never reported back.	Recurrence of primary and glands.
7. "B"	Treated in May, 1931; died in July, 1931.	Information not exact.
8. "C"	Treated in July, 1931; mandible involved; refused dissection. Died 1933.	Extension.
9. "C"	Treated in March, 1930. Last seen, alive and well in June, 1933. Died in October, 1934.	Secondaries in liver—??
10. "C"	Primary lesion healed.	Secondaries in the neck.
11. "C"	Treated in May, 1930. Inadequate. The condition extended and showed no response to any treatment. Died in December, 1930.	Both primary and secondaries uncontrolled.
12. "B"	No glands in May, 1930; developed glands in February, 1934. Interstitial radiation only. Died in 1935.	Extension of glands.
13. "C"	A very late case, treated for palliation in August, 1930.	Died December, 1930.
14. "C"	Alive and well in February, 1931. Glands developed in January, 1932. Never reported back. Died July, 1932.	Extension of glands.
15. "A"	Alive and well in August, 1931. Did not report back. Died in September, 1933—apparently recurrences.	Information not exact.
16. "B"	Primary lesion and glands healed.	Died with multiple skin recurrences and visceral metastases.
17. "A"	Alive and well in December, 1930. Died June, 1931. Apparently died of disease.	Information not exact.
18. "D"	A very late case. Alive and well in December, 1930. Died November, 1931. Did not report back.	Apparently extension of glands.
19. "B"	January, 1930, refused adequate radiological treatment; consulted an irregular and had "paste". Died in April, 1931.	Recurrence of primary.
20. "B"	Treated in November, 1929. Last seen in November, 1931, alive and well. Died April, 1934.	Said to have died of "Cancer of the Stomach".
21. "D"	A very late case. Treated for palliation only in December, 1929. Died of hæmorrhage in March, 1930.	Extension of both primary and glands.
22. "A"	Pre-operative radiation, and dissection of neck; no pathological report.	Died from complications following operation; operative death.
23. "C"	Glands on admission, stage "C". Dissection of the neck, pathological report positive. Died 9 days following operation.	Operative death.

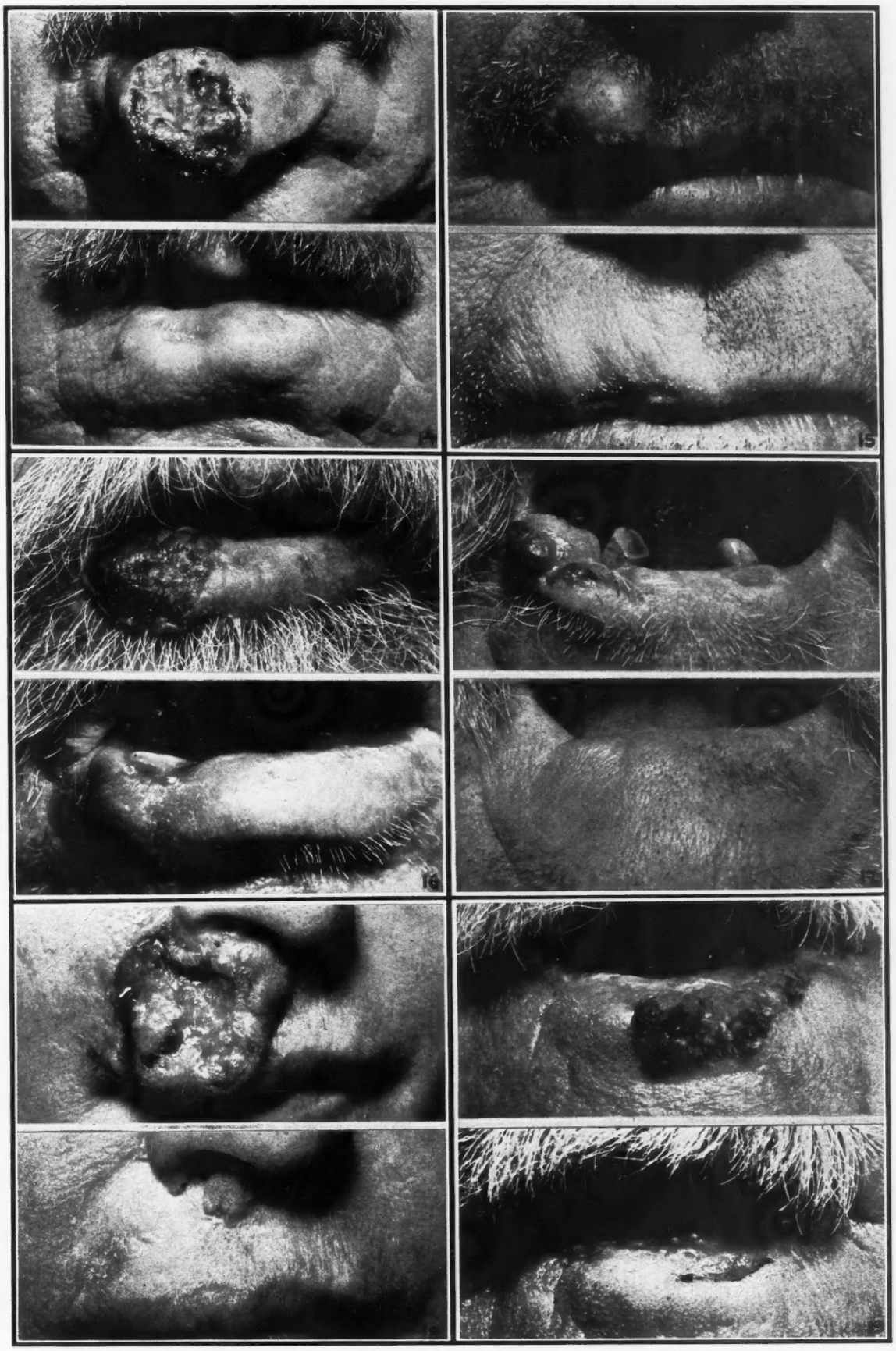
failures occurred in the earlier years, whereas with added experience and better facilities the failures in this respect have been fewer, even though there have been a considerable number of very advanced cases. Since 1931 there have been no failures to obtain healing of the primary lesion, regardless of size or duration.

Permanency of healing.—In 7 cases healing has occurred, to be followed later by recurrence. These recurrences have all healed satisfactorily under further treatment without subsequent recurrence to date. All of these recurrences of primary lesions have occurred within one year of the original treatment, and in all cases followed, if the primary lesion has healed satisfactorily and has remained healed for one year or more, recurrence has not taken place.

In addition to the above 7 cases, reference has already been made to 3 in which recurrences took place and were not controlled by subsequent treatment. So that out of the total of 334 cases treated there have been 10 recurrences, of which 3 have been uncontrolled and form 3 of the 13 failures.

Our conclusion is that a recurrence is unlikely after one year, and when it occurs is only slightly more serious than the original lesion, if uncomplicated by glandular metastases.

Follow-up according to the permanency of healing of the primary lesion.—No other group, except cancer of the skin, presents quite so much difficulty in obtaining an accurate follow-up over a period of years as does cancer of the lip. After the lesion has once healed it is extremely



Group B.—Classified as stage II, illustrates various types of lesions and cosmetic results.

TABLE VII.

DEATHS DUE TO EXTRANEOUS DISEASE—SHOWING CAUSE OF DEATH

Stage	*Age*	*Duration of time from first admissiontohospital*	*Cause of death*
1. "B"	20	1¼ years	Lupus erythematosus.
2. "B"	95	2 months	Pneumonia.
3. "B"	74	9 months	Cardiac failure.
4. "A"	75	18 months	Cardiac failure.
5. "B"	80	18 months	"Cancer of the Stomach." His doctor reported "No sign of cancer of the lip.
6. "A"	72	1 year	Gangrene of the leg.
7. "B"	72	3 years	Old age?? His doctor reported "Other causes than the cancer treated on his lip".
8. "B"	74	3 years	Coronary thrombosis.
9. "B"	77	2½ years	Following prostatectomy.
10. "C"	86	6 months	"Stroke."
11. "B"	61	18 months	Influenza.
12. "A"	71	18 months	"Chronic bronchitis."
13. "A"	60	5 years	Uræmia and cardio-vascular condition.
14. "A"	72	4 years	Fractured hip—"bronchitis."
15. "A"	71	3 years	"Stroke."
16. "A"	74	5 years	"Stroke."
17. "B"	84	5 years	Old age.
18. "A"	69	3 years	Cardiac failure.
19. "A"	59	6 months	Suicide. "His lip was healed."
20. "A"	43	9 months	Diabetes.

In all cases the lip cancer remained healed at the time of death, and no glandular secondaries were present.

difficult to get the average patient to return, especially if, as is the case in many of our patients, the distance is great and the expense correspondingly heavy. The following table of cases alive and without recurrence shows the time which has elapsed from treatment to the last examination at the Institute clinic or by a responsible medical practitioner.

TABLE VIII.

METHOD OF TREATMENT—RADIOLOGICAL

Healing without recurrence for less than—	
1 Year	39 Cases
1 to 2 Years	50 "
2 to 3 Years	77 "
3 to 4 Years	31 "
4 to 5 Years	25 "
5 to 6 Years	20 "
6 to 7 Years	8 "
Untraced	35 "
	285 Cases

Cosmetic results following treatment.—On the whole the cosmetic results following radiological treatment of lip cancer are excellent, and, partly because of this fact, patients will readily submit to this treatment at a much earlier stage of the disease than they will to a surgical operation. In practically all pre-cancerous lesions and most of those in stage I the scarring resulting from radiological treatment is either entirely absent or is very slight, and the tissues remain soft, elastic and almost normal. In the later stages there is always more or less scarring, though here also the disfigurement is not great until stage IV is reached. In these cases there has already been extensive loss of tissue by actual destruction or replacement of tissue by growth, and the best that can be hoped for is control of the malignant disease at the expense of disfigurement.

In a small percentage of cases, owing to shortcomings of technique in carrying out the original treatment, there may be undesirable sequelæ which require plastic surgery. In the present series there were two such cases, which indicates at least that the risk is not great.

TREATMENT OF GLANDULAR SECONDARIES

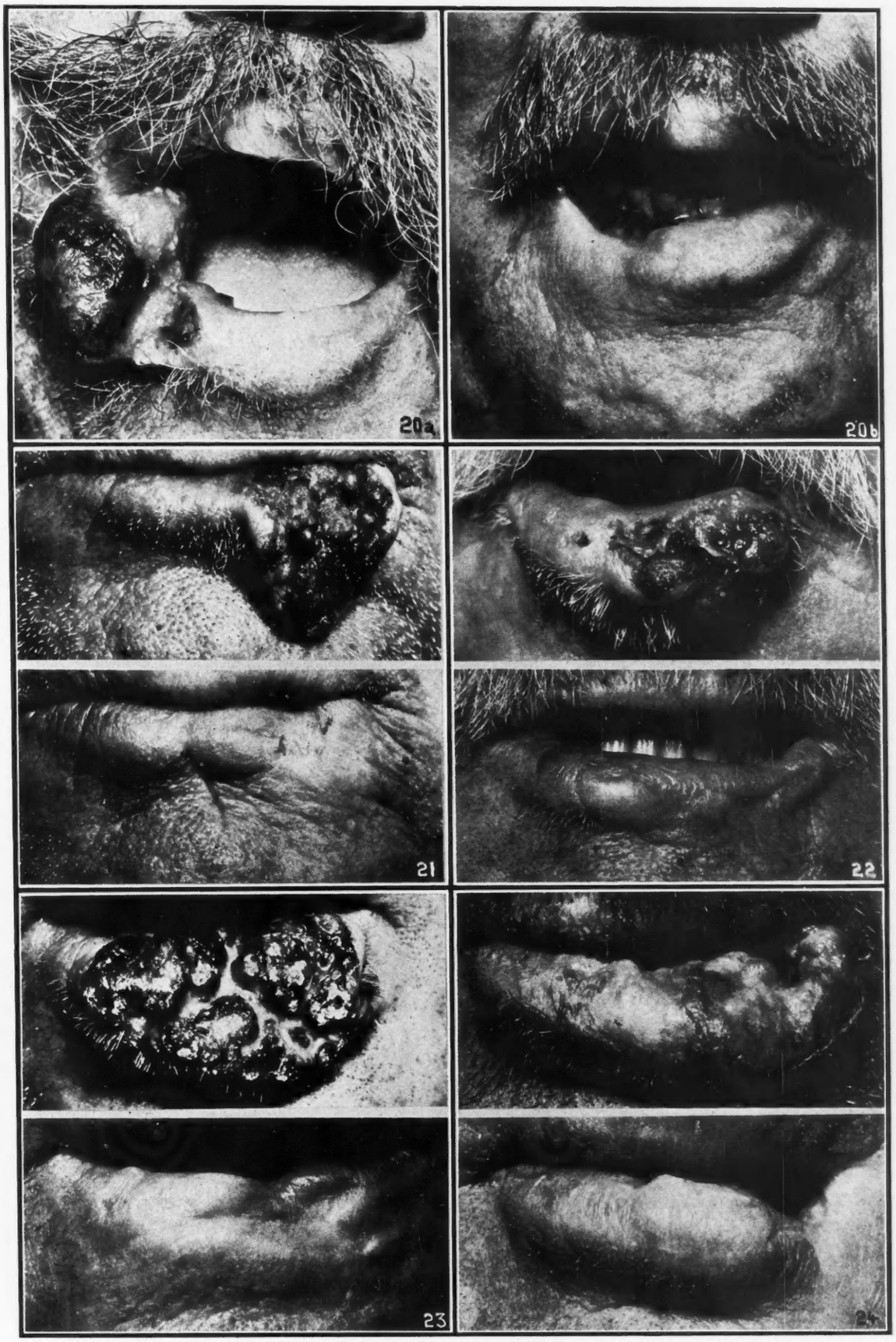
The problem presented by involvement of regional lymphatics is common to the whole group of oral carcinomata. A special investigation of this aspect of the subject is being undertaken, the result of which will be presented as a joint publication with the surgical consultant in the near future. In this paper it is proposed to analyze the occurrence of glandular and other complications in the several varieties of oral cancer, the methods which have been adopted in dealing with them and the results obtained. In the present paper therefore this part of the subject will be limited to a brief review of the more essential facts, leaving the detailed discussion and interpretation of these facts for the later communication.

As previously indicated the cases were placed for study in the following groups:

1. No palpable glands present on admission.
2. Glands questionable on admission.
3. Palpable glands present on admission. (*a*) Small, discrete, unilateral. (*b*) Larger, more numerous, unilateral, or small, discrete, bilateral. (*c*) Large, massive, matted, either unilateral or bilateral.

GROUP (A) STAGE I. 248 CASES

This group may be taken as representing the average early lip cancer, forming, as has previously been shown, 74 per cent of the total. Of these 224 had no palpably enlarged glands on admission. In 19 the presence of glands was questionable. In 5 cases definitely enlarged glands were present on admission.



Group C.—Classified as stage III, together with the cosmetic result following treatment.

Of those in whom no glands were present on admission 5 are stated in records to have developed glands subsequently, three of which were proved to be malignant. The incidence in this group therefore was a minimum percentage of 1.3 and a maximum of 2.3 per cent. Of these 5 cases, 3 are alive and symptom-free, 2 have died of the disease.

In 5 cases palpably enlarged glands were present on admission. Three are alive and well, one died of the disease, and one is alive with recurrence in the neck.

GROUP (B) STAGE II. 61 CASES

Of these 45 had no glands on admission. In 9 the presence of glands was questionable and in 7 glands were palpable on admission. Of the 7 cases in whom glands were present on admission, one is alive and well, 3 have died of the disease, one died of extraneous disease without recurrence, one is alive with recurrence in the neck, and one is untraced.

GROUP (C) STAGE III. 20 CASES

This group represents advanced lesions almost always complicated by gross ulceration and considerable secondary infection. Of these 7 had no palpable glands on admission. In one glandular involvement was questionable while 12 had definitely palpable glands present. Not only have glands become more frequent but they are also much more advanced. Of the 12 cases in which glands were present, only 2 were classified as in the (*a*) group, *i.e.*, moderately advanced, whereas 7 were in the (*b*) group, and 3 were in the (*c*) group, far advanced.

Of the 12 cases having definitely palpable glands on admission, 2 are alive and symptom-free, 6 died of the disease, there was one operative death, 2 have died of extraneous disease, and one is alive with recurrence present.

GROUP (D) STAGE IV. 5 CASES

These represent such an advanced stage as to be usually quite hopeless so far as permanent cure is concerned. To what extent teleradium therapy may contribute towards an improvement in this matter is not yet clear. It may be seen, however, by reference to the photographs that apparently hopeless primary lesions have been healed by this means and two of these cases have been carried without recurrence for 2 and 3 years respectively. All of these cases had palpable glands present on admission. Two are alive and apparently symptom-free, one after 2 years, and one after 3 years. Three have died of the disease.

The details of the above facts are summarized in Table IX.

TABLE IX.

RESULTS ACCORDING TO GROUPS AS CLASSIFIED. GLANDS PALPABLE ON ADMISSION.

Stage	*No. of cases*	*Number having glands on admission*	*Alive and well*	*Died of disease*	*Died of extraneous disease*	*Under treatment*	*Untraced*
"A"	248	5	3	1	..	1	..
"B"	61	7	1	3	1	1	1
"C"	20	12	2	7	2	1	..
"D"	5	5	2	3			

THE QUESTION OF PROPHYLACTIC TREATMENT

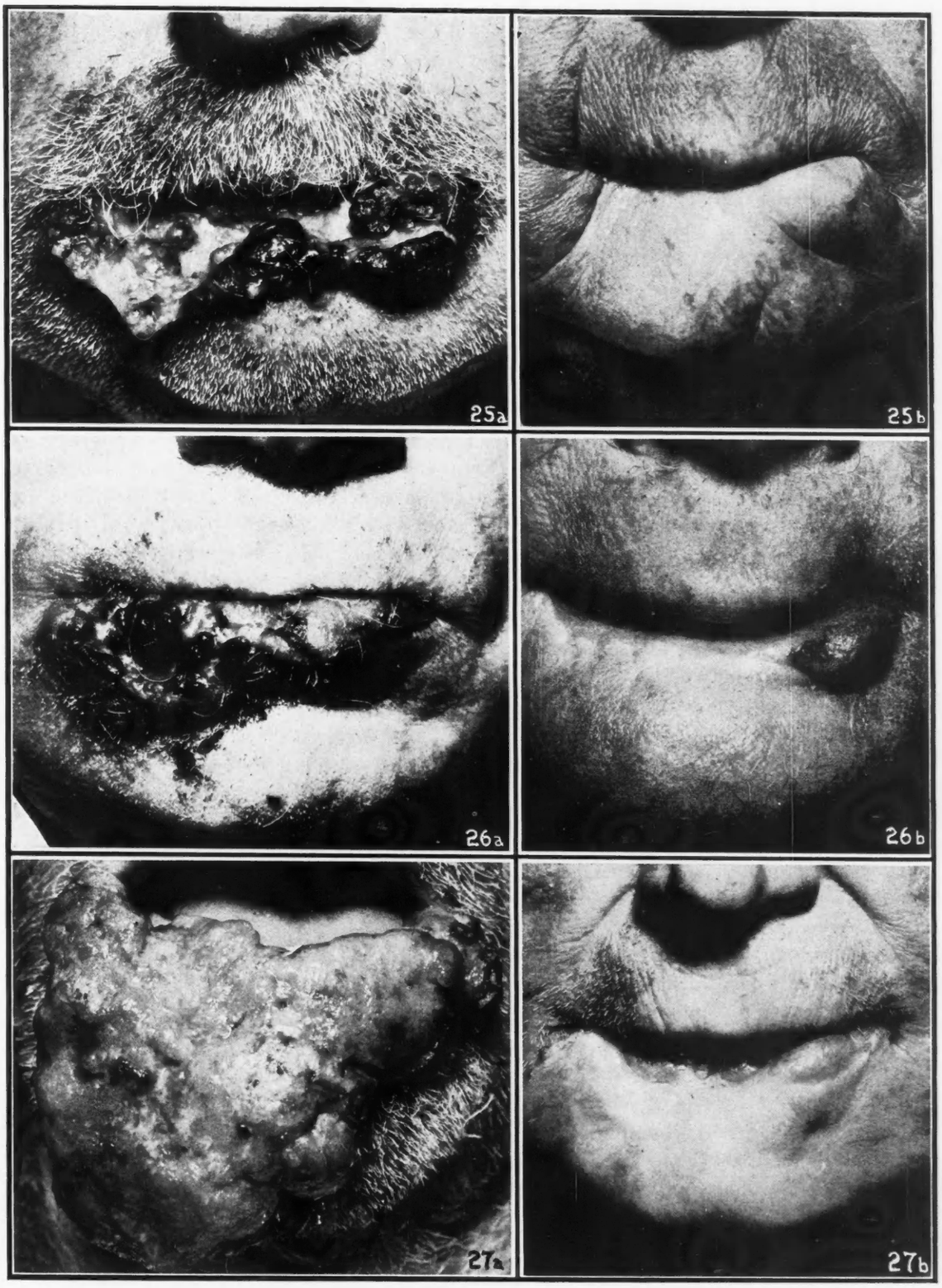
It will be enquired what steps if any were taken to prevent the spread of the disease in those who had no glandular involvement on admission. The necessity for and the value of prophylactic operations and radiological treatments upon the neck have been under discussion for many years. The present study brings out certain facts which have a bearing upon the question. Two hundred and sixty-two patients, or practically 72 per cent of the total, had no glands on admission. Of these, deducting those who cannot be traced, accurate information is available regarding 225. Two hundred and four are alive and well; 2 have died of cancer; 16 have died of intercurrent disease without recurrence; and 3 are alive with recurrence or are still under treatment.

If we examine the method adopted in those only who are known to be alive and without recurrence we find that 186 received no treatment of any kind to the glandular areas; 17 were treated radiologically, and 1 was treated by neck dissection. It would however be quite proper also to include those who died of intercurrent disease without recurrence in such a consideration. If this is done the figures are:—

TABLE X.

No treatment	201
Radiological treatment	18
Surgical treatment	1
Total	220

If the conclusion is thereupon reached that if a patient having a lip cancer has no palpable glands, no prophylactic measures are indicated, the question then arises what risk such a patient is taking? The answer appears to depend very



Group D.—Classification stage IV. There has been loss of tissue from the disease in all cases, with considerable deformity following treatment.

materially upon the stage of the disease. In stage I, of a total of 224 patients having no glands on admission 3 later developed definitely proved glandular involvement, a percentage of 1.3. In stage II, out of 44 without glands on admission 6 developed glands, or 13 per cent. In stage III, out of 7 without glands on admission 2 later developed glands, or 28.5 per cent. Stage IV all had glands on admission.

Thus it would appear that the risk the patient is taking of developing glands in the three groups is as follows: stage I, 1 to 2 per cent; stage II, 13 per cent; stage III, 28.5 per cent; stage IV, 100 per cent.

The question next arises what risk does the patient take in submitting to prophylactic operations. The general opinion, based upon a review of surgical literature, places the operative mortality in routine block dissections of the neck at 11 per cent.[2] Applying this mortality rate to our own cases, had routine neck dissections been carried out in the 224 patients in this group (stage I) there would have been 24 operative deaths in an effort to prevent the development of glandular secondaries, which in actual fact developed in only 3 patients, and resulted in 2 deaths as previously reported.

So far as radiological measures are concerned, we have seen no evidence to convince us that external irradiation of the neck as commonly practised for prophylactic purposes can either prevent the development of glandular secondaries or control them once established. The only patients in whom glandular secondaries have disappeared, in our experience, as a result of external irradiation, have received very heavy and prolonged treatment, which seems much too severe a method to which to submit 224 patients without much stronger reasons than at present appear to exist.

STAGE II CASES

In the next group the risk of developing glands has risen to 13 per cent, and in the group of 6 cases thus resulting 3 are alive and well following neck dissections, and there was one operative death. One patient treated radiologically has died of extension and the other will ultimately do so. The record then is 50 per cent each way, with 3 deaths to record. Had routine neck dissections been carried out in this group, carrying a mortality of 11 per cent, there should have been 4.8 deaths from this source.

Radiological methods, as ordinarily used for prophylactic purposes, have no more to offer in this group than in the earlier ones and may be disregarded. It would seem that in this stage there is a slight advantage to the patient in waiting and submitting to operation or treatment only if or when glands develop.

STAGE III CASES

Here the risk of developing glands has risen to 28.5 per cent, since of 7 patients without glands on admission 2 later developed glands. One of these was treated by neck dissection and is alive and well after five years. One treated radiologically died of extension of the disease after four years. There was no operative mortality in this group. The numbers in the group are too small to give much significance to extended analysis.

The conclusion we have reached is that neither prophylactic operations nor radiological treatments offer sufficient benefits to justify their routine use. Obviously the most useful service the medical profession can render in the situation is to recognize and successfully treat these lesions long before they reach those stages in which the glandular danger has reached such proportions as 13 per cent or 28.5 per cent.

GENERAL SUMMARY

1. The results of the treatment of 335 cases of malignant lesions on the lips are analyzed.

2. Accurate information is known regarding 300 of these, 84.4 per cent of whom are alive and well and known to be without recurrence.

3. Healing of the primary lesion by radiological treatment was obtained in 96.5 per cent of the cases, up to 1931, and 100 per cent since that time.

4. The conclusion is reached that radiological methods are a satisfactory form of therapy in dealing with the primary lesion in lip cancer.

5. It is felt that in view of the excellent results obtainable by these methods in early lip cancer there should be no excuse for permitting any case to progress beyond stage I.

6. The conclusion is reached that prophylactic operations and radiological treatments are both inadvisable. This subject will be discussed in greater detail at a later date.

REFERENCES

1. MARTIN, H. E.: Treatment of cancer of the lip, *Am. J. Surg.*, 1935, **30**: 215.
2. KENNEDY, R. H.: Epithelioma of the lip, *Ann. Surg.*, 1934, **99**: 81.

THE EFFECT OF THE ADMINISTRATION OF ŒSTROGENIC HORMONES ON THE NASAL MUCOSA OF THE MONKEY (MACACA MULATTA)

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THE problem of the naso-genital relationship in man, upon which some of the earliest observations had been made by Hippocrates and Celsus, received much attention from both rhinologists and gynæcologists towards the end of last century and at the beginning of this, until about 1912.

Starting with the publication of clinical observations by Mackenzie[1] (1884) and Fliess[2] (1897) a considerable literature[3] dealing with this subject has accumulated, dealt with in three main aspects: first, its bearing upon dysmenorrhœa; second, the relationship of epistaxis to menstruation and pregnancy; and, third, and to a less degree, the essential nature of the naso-genital relationship as a normal physiological process, which last was chiefly speculative. By far the greater part of it is confined to evidence derived from human clinical material, there being considerable disagreement amongst authors as to the condition in the nose at different physiological times, and there would seem to be a lack of controlled experimentation designed to throw light on the nature and conditions of the relationship.

Koblanck and Roeder[4] (1912) reported sexual hypoplasia in dogs and rabbits following the removal of the nasal conchæ in young animals. Owing to the high mortality from post-operative obstruction to breathing, suppuration and bronchitis, there survived for an adequate length of time only three rabbits and three dogs upon whom the operation had been done. That the animal's general condition had suffered was indicated by body weights less than those of the controls, but the sex-gland weights were markedly less and there was evident hypoplasia. The authors were not very satisfied with their results.

Karpow[5] (1929) performed double turbinectomy on male rabbits at 5 to 6 weeks. At 39 weeks the testicles were undescended and weighed 50 per cent less than those of the controls. Here again there was evidence of a general effect in the less weight of the treated animals. Recently, Nemours[6] (1935) has repeated this work, operating first on one side at the 4th to 5th week, and on the other ten days later. Of 7 animals that survived to 6 months of age, 5 grew normally and the testicles were normal in their descent and weight at death. In 2, however, the testes failed to descend, weighed markedly less than those of the controls, and histologically showed no spermatogenesis beyond the spermatocyte stage, at which time degenerative changes took place. The pituitary gland in these animals did not show castration cells.[7] Such evidence of a specific effect is not convincing.

Borghesan[8] (1931), also in the rabbit, reported degenerative changes in the nose after castration, which observation Pighini and Porta[9] (1934) confirmed, finding definite re-integration of the affected nasal areas after treatment with liquor folliculi, with a histologically more marked improvement after treatment with crude extract of anterior lobe pituitary. In discussing these results, they admit that, if the amelioration produced by liquor folliculi be due to a hormone replacing the sex gland, the greater improvement which follows anterior pituitary treatment cannot be explained by gonadotropic action, since the animals are castrates. They consider this effect to be produced by direct action, and suggest the possibility of its being due to the growth hormone or the thyreotropic fraction, both of which such extracts undoubtedly contain.

Wiraboff[10] (1934) examined the nasal mucosa of rats and mice during the sex cycle, to ascertain whether the cycle coincided histologically with changes in the nasal mucosa. In a detailed study of 9 rats and 5 mice he found no histological variation with the cycle, the mucosa remaining normal throughout. In certain rats he observed a hyperæmia and leucocytic infiltration, from which he drew no conclusions, but did not believe this to be provoked by the cycle. "Menformon" injections neither prolonged the cycle nor affected the nose histologically.

In regard to histological studies made upon the nasal mucosa of the white rat in this connection it is as well to keep in mind the recent work of Smith and Craigie,[11] who describe a condition which occurs spontaneously in a high percentage of the supposedly normal rats which they have examined. From a "pathological process in the nasal cavity" there is a destruction of the olfactory cells, leading to an atrophy of the centrally directed processes that make up the olfactory nerves. In healing changes in the mucosa result, chiefly characterized by replacement of the sensory type of olfactory mucous membrane by ciliated columnar epithelium. "The vomeronasal organ is only rarely involved, thus accounting for the relative freedom of this centre from stunting."

We became interested in this problem from observation of a French-Canadian family of nine children all of whom suffered from atrophic rhinitis, as did both parents. In the cranial skiagrams of all of them definite evidence of dyspituitarism was found. Four of them, females ranging from 11 to 20 years, showed marked evidence of an early hypopituitarism, and, of these, 2 suffered from amenorrhœa. In a moderately large series of cases of atrophic rhinitis studied we have found this feature present in 80 per cent, and have come to the conclusion that the constitutional factor in this disease may be

related to pituitary function, both in the family and in the individual. Since the possibility arises that the anterior pituitary may exercise an effect on the nose, either directly in its control of facial differentiation, or possibly through the gonad by its gonadotropic action, it was decided first to investigate the effect of crystalline œstrogenic hormones on the monkey's nasal mucosa, since its physiological relationship is closer to man than to either the rabbit or the dog. In addition the monkey presents the advantage of possessing a nose which, anatomically, is very similar to man's.

ANATOMY OF THE NASAL CAVITY IN THE MONKEY *(Macaca Mulatta)*

(Fig. 1.) The nasal chamber is almost an isoceles triangle in shape, the base of which along the nasal floor, in a young adult, is about 40 mm. long; its vertical height is about 25 mm. The cranial wall is short and narrow and is formed by the cribriform plate of the ethmoid bone. The dorsal cranial wall is covered by the mucous membrane on the ventral aspect of the sphenoid bone. There are no sphenoidal ostia, since the sphenoidal sinus, like the frontal sinus, is absent in the monkey. The cavity, while in a sense bearing a close resemblance to the human nasal cavity, differs from it in certain important features. It is relatively longer antero-posteriorly and shorter vertically than in man. Owing to prognathism and the poor development of nasal bones and cartilages its vestibular part is relatively much smaller than in man. The nostrils have their long axes in an obliquely transverse plane. In older animals they are relatively roomy but in the immature they are apt to be narrow and slit-like. The lateral nasal

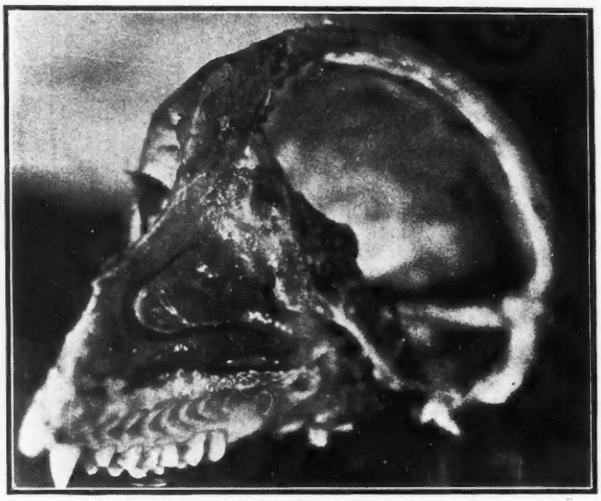


Fig. 1.—The right nasal cavity of *Macaca mulatta.*

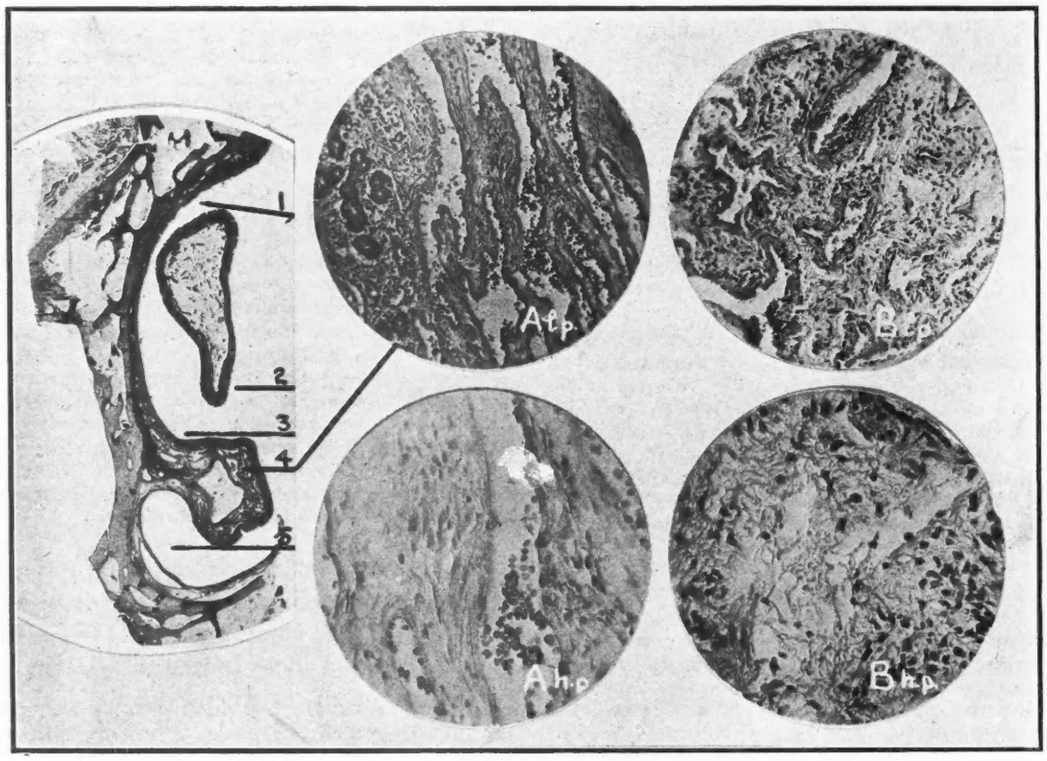


Fig. 2

Right nasal cavity (normal) — coronal section. 1. Superior meatus. 2. Middle concha. 3. Middle meatus. 4. Inferior concha—site of section A. 5. Inferior meatus.

Sections "A".—Normal structure of the cavernous tissue, in the inferior concha of an adult female monkey. (Low and high powers.) Sections "B".—After hypodermic injection of 1,000 gamma of crystalline keto-hydroxy-œstrin, in oil, daily for 14 days: the conchæ are swollen with a marked perivascular œdema and great opening out of the connective tissue, in the cavernous tissue septa. (Low and high powers.)

wall bears the nasal conchæ, which are homologous to the middle and inferior conchæ in man and occupy relatively similar positions. There is nothing corresponding to the so-called "concha superior" or to the "concha suprema" of the human nose, in which area the nasal wall is smooth and largely olfactory in function.

The *upper concha*, which we will call, for its human homologue, the "middle" concha, is a tongue-shaped process directed downwards and forwards from its attachment on the dorsal part of the lateral nasal wall. Its mesial surface is smooth and flattened, and its superior, anterior, and inferior borders are clean cut, somewhat sharpened and free. On directing the speculum upwards and outwards towards the lateral nasal wall the rounded, though thin, free border as it forms the tip of the concha can be clearly seen, together with the adjacent, most anterior parts of the lateral and mesial surfaces of the concha. Beyond, on the lateral side, are the confluent airways of the superior and middle meatuses and, mesially, the also relatively narrow airway between the flat mesial surface of the concha and the septum. The lateral surface of the concha is more convex and scroll-like than the mesial.

The mucous membrane covering the *"middle" concha* varies in colour with the age of the monkey, its physical condition, and whether or not it is mature; also, as we shall show, with the stage of the sexual cycle. In immature females it is paler in colour; especially if the monkey is somewhat anæmic, as it is apt to be if recently imported. In a sick animal it may be grey, even with a slightly faint cyanotic tint, which appearance is shared by other visible mucous surfaces. In healthy untreated adults there is considerable individual colour variation from a pale pink to a bright, healthy red. This zone of variation in normal animals we delimit on the charts by the zone R.-O.-P.

The inferior concha begins in front as an expansion from the dorsal part of the vestibule, from the lateral wall of which it gradually rises, somewhat ventral to the prominent tip of the middle concha, and under cover of which it gradually assumes the form of a rounded shelf, some 4 or 5 mm. in width and almost as much in thickness. This shelf extends dorsalward to a little beyond the level of the posterior margin of the hard palate, where it merges into the lateral wall of the naso-pharynx. Its free or septal border is rounded and thick (about 4 or 5 mm.), and covered with mucous membrane, which ordinarily lies in rugæ. If the point of the speculum be depressed towards the floor of the nose and then directed outwards the light strikes this border tangentially, throwing the rugæ into relief; in an adult nose, almost the anterior half of the concha is thus made visible. When the cavernous tissue is distended with blood the rugæ are smoothed out and it becomes a deeper red or almost purple colour. At the anterior extremity, where the cavernous tissue is less well marked, the colour will then have a somewhat more fiery tint.

Caudal to the concha is the inferior meatus into the ventral part of which opens the naso-lacrymal duct. Above the concha, on the lateral nasal wall, when the middle concha is removed, can be seen the hiatus semilunaris into which the antrum opens. Between the conchæ and the septum the airway is relatively much narrower than in man, and deviation of the septum we have found relatively frequently. Changes in appearance in the inferior concha are not only less evident to the eye, but are more difficult to observe; they follow very closely, however, those occurring in the "middle" concha. In order to simplify our graphs we have charted only the variations found in the middle conchæ. It happens not infrequently that the degree of change in the two sides is not equal, in which case the mean of the two sides is taken.

THE MICROSCOPIC ANATOMY OF THE CONCHÆ

The middle concha.—Fig. 2 shows a coronal section through the anterior part of the middle concha and of the part of the inferior concha vertically caudal to it. The core of the concha is composed of a scroll-like process supported by thin bony trabeculæ, the interspaces of which are marrow-filled. The mucosa rests upon a thin plate of compact bone, the periosteum of which is intimately attached to the tunica propria of the mucous membrane. This is composed of an abundant connective tissue network, which contains many elastic fibres and is abundantly vascularized. It contains many mixed glands of the tubo-alveolar type, which branch freely in the deeper part and are lined with both mucous and serous cells. Deep to the glands, in this layer, are very numerous vascular spaces, and these are also to be found between the gland groups, where they are of smaller size. Separating this layer from the epithelium is a well-defined basement membrane upon which rests a stratiform, ciliated, columnar epithelium, the slender ends of whose cells rest on the basement membrane, their more bulky ends forming the free surface. Between these, and resting on the basement membrane, are other columnar cells which do not form part of the surface; also, there are many mucus-containing goblet cells. The epithelium is similar to the respiratory epithelium in man.

The inferior concha.—Here the bony lamina upon which the mucosa rests is roughly quadrangular, and between its supporting trabeculæ the spaces are marrow-filled. The mucous membrane has the same epithelial covering as in the middle concha. The tunica propria is intimately connected to the periosteum, but the mucous membrane in this situation is at least 3 or 4 times thicker than in the middle concha, owing to its containing in its submucous zone vascular cavernous tissue, which for the most part lies deep to the mixed glands, and is composed of large branching and communicating endothelial-lined venous spaces forming an "erectile" structure very similar to the inferior concha in man. In the latter, Schaeffer[12] (1920) describes the occurrence of circular and longitudinal bundles of smooth muscle imbedded in the walls of the venous channels of the plexus cavernosi concarum. Maximow[13] (1930) is of the opinion that this does not form an erectile tissue, owing to "the absence of septa containing smooth muscle". In *Macaca mulatta* we have found that the septa in the cavernous tissue of the inferior conchæ contain smooth muscle fibres.

THE ENVIRONMENTAL AND ATMOSPHERIC CONDITIONS

In an investigation such as the present one, in which the areas under observation are, in man, known to be highly liable to changes induced by atmospheric and other conditions, it is essential to describe the general environment of the animals as well as the temperature variations met with during the experimental period.

The monkeys are kept in six large indoor cages, 12 ft. by 9 ft. in area, and 8 ft. high, in a building heated in winter. Three of the cages communicate with three outside, wired-in enclosures on the roof, 15 ft. by 14 ft. and 6 ft. high, the doors of which the animals can open at will. Thus, half the colony has access to the outside on alternate weeks throughout the winter. Free use of it is made even in zero weather. Throughout the experimental period a record was kept of

indoor and outdoor temperatures and whether or not each monkey had had access to the outside. Artificial heating is from October onwards, but the indoor temperature is somewhat influenced by outdoor changes, so that temperature variations of from 58 to 72° F. were registered in the indoor cages. The maximum difference between outdoors and indoors was 60° F., in January. Throughout December, January and February the average difference (between outdoor and indoor temperatures) was from 40 to 50° F. It was at first thought that an animal having access to the outside would show considerable change in the vascular condition of the nasal mucosa in consequence, and it was feared that this might prove a complicating factor in observation. This fear, however, proved unfounded, and it can be said in passing that allowing the animals free access to the open air at all seasons has been very beneficial to their general health. Since its adoption no death from tuberculosis has occurred, while previously, when the animals were confined to small cages indoors, death from tuberculosis was not infrequent.

We have not found catarrhal affections of the respiratory passages in general to be common. Of the 29 monkeys used in the total series 62 per cent showed no trace of any catarrh throughout the entire period. Of the 38 per cent which did at one time or another show catarrh 19 per cent (5 animals) showed only a very slight, mucous discharge on one occasion, during the colder months. Two animals showed slight rhinitis at 2 examinations; 1 animal showed it 3 times, while 3 other animals had the condition intermittently; 1 animal showed discharge on 5 weekly examinations, another on 7 occasions, and 1 had a chronic condition with rhinitis on 11 occasions. Evidence of rhinitis is the presence of a thin mucous, or muco-purulent discharge, the mucosa being whitish, somewhat bleached looking and boggy. The animal does not seem to have any definite constitutional symptoms. The condition is not contageous, is confined to the nasal passages, and usually clears up in the course of 1 or 2 weeks. As the discharge diminishes there is a slight tendency to crusting. Such rhinitis as we have observed has at no time produced reddening of the mucosa, nor does the presence of a mild degree of rhinitis render invisible the physiological colour changes produced by œstrogenic hormone injections.

As the study proceeded, we became impressed with the well-marked, even striking, stability of the monkey's nasal mucous membrane. Throughout the cold months, when the temperature is frequently in the region of zero, on chasing half the number from the outdoors into an atmosphere of 65 to 70° F. for examination, it was impossible to distinguish the animals which had been outdoors from those that had been indoors all week by any difference in the nasal mucosa. The variations in colour and activity of the mucosa which we report, when graphed with observations of outdoor and indoor temperatures on the days of observation and with the record of whether any given animal has had access to the outside on those dates or not, demonstrate a complete lack of any correlation between those facts.

It is well recognized that in man the degree of vascular and glandular activity of the mucosa is extremely labile, that even during a single nasal examination the condition of the mucosa may quite alter, from nervous or other causes. We have at no time observed this in any of our monkeys, although usually during the examination there is excitement due to being held. We have, however, noted temporary engorgement of the mucosa, especially of the middle concha, due to pressure upon the vessels of the neck by an attendant, when the animal is improperly held or when it struggles with the glottis closed. Associated flushing of the face gives indication that this factor is at work.

The Appearance of the Mucosa on Speculum Examination

The animal is held down with its lumbar region resting upon the back of the right hand of one attendant, which hand grasps the monkey's crossed elbows, while the left steadies the head, with the palm on the vertex, the face being turned slightly towards the examiner; a second attendant holds the legs. A Cameron nasal speculum is used, which carries its own light, projecting a brilliant beam between the jaws of the instrument. It is almost impossible to use a frontal mirror. The point must be directed first well outwards and upwards, to bring the middle concha into view, then downwards towards the floor of the nose as well as strongly outwards, to bring into view the inferior concha. The tendency at first is to have the point directed too far inwards, so that the septum fills the field; this is fairly often deflected, and if touched (it is very close to the point of the speculum) it bleeds very readily.

In cyclic animals varying states of appearance can be seen in the mucous membrane, and, over

a course of months, we have observed in the same animals three differing vascular patterns in the mucosa, irrespective of colour. (a) The mucosa may seem "homogeneous", that is to say, there are no visible capillaries or mottling of its surface. (b) It may be "mottled", showing a surface apparently composed of contiguous small circular zones, whose centre is somewhat lighter in colour, almost yellowish, without, however, the occurrence of any visible capillaries. (c) There may be visible surface capillaries, especially along the lateral aspect of the sharp-cut border of the tip of the middle concha. These three patterns seem to be to a great extent independent of the colour of the concha, which is usually most marked at the tip. The three patterns may pass from one to the other in the course of several weeks, but we have been unable to correlate them in any significant way with the cyclic change in vascularity which we are to report.

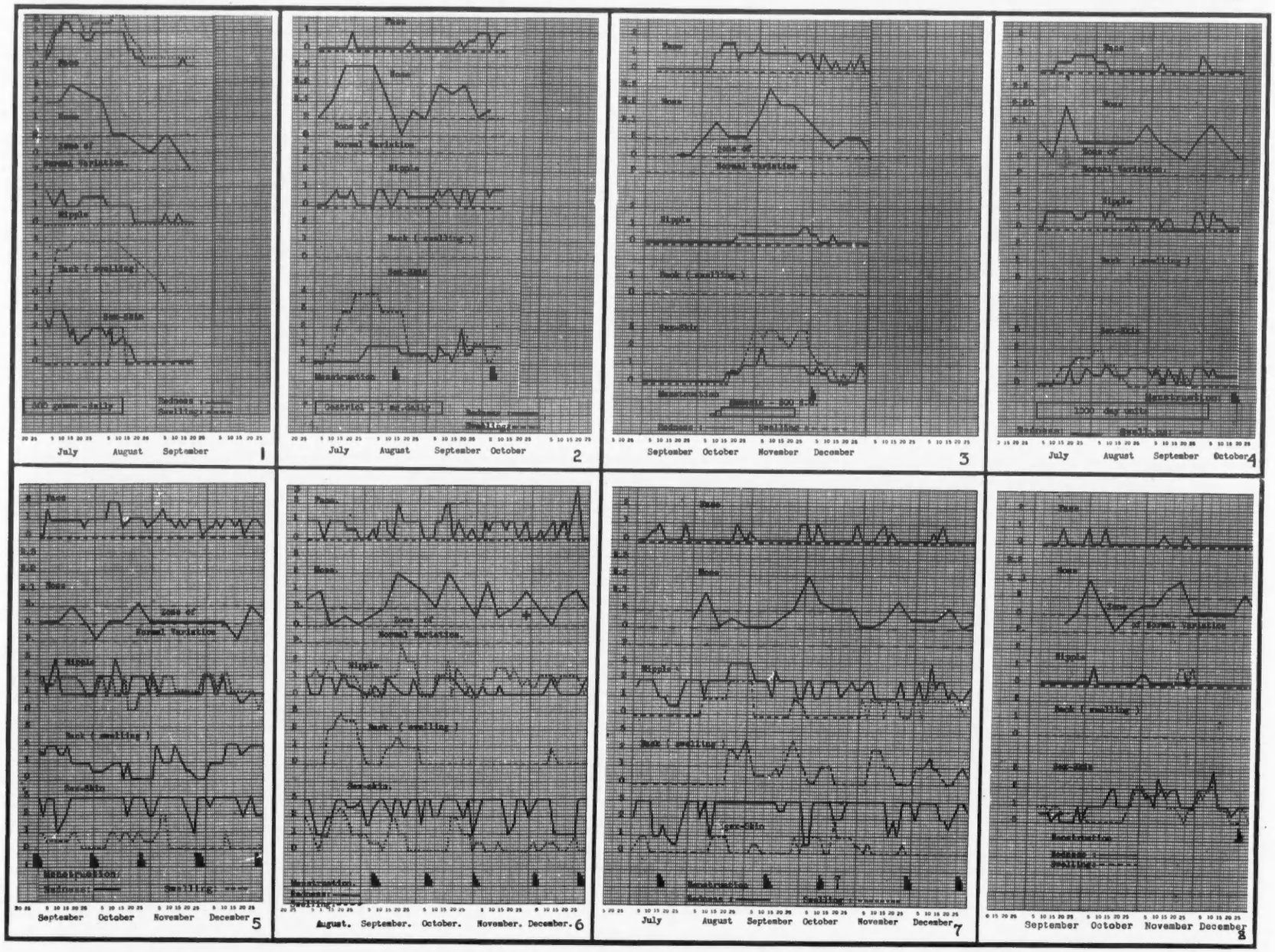
Normally, the mucosa has a moist appearance, which changes, when secretion is marked, to a clear glistening look, and this may exist apart from actual swelling. When this happens, there is a tendency for the vascular pattern, if it has previously been (b) or (c), to become (a). We have come to accept such glistening as evidence of glandular activity, describing it simply as an active mucosa. We have found it occurs in the prodromal stage of swelling of a physiological and not a pathological nature. It does not lead to the presence of discharge in the nasal cavity.

THE EXAMINATION PROCEDURE AND CONTROL OF THE OBSERVERS

During the first four months nasal examinations were made by three observers, thereafter by two. They were made weekly, at the same hour, in a room lit by a diffuse north light which proved ideal for colour judgment when using a speculum light. Under the same conditions two other trained observers independently recorded, every second day throughout the whole period, the colour and/or swelling of the sex-skin, face, nipples and back, and the presence or absence of vaginal bleeding. They did not disclose their findings to the nasal observers. Every three months the nasal findings and the record as to whether the animal had been out or not were charted on one-year graph-paper, after which the graphs of face, nipple, back and sex-skin activity (reddening and swelling) were charted. On similar paper a graph was made of the indoor and outdoor temperatures in such a way that it could be accurately placed upon the nasal graph. Throughout the whole period the following facts were undisclosed to the observers—the identity of the monkey, its sex, whether it was sexually mature or not, whether it was intact or castrate, whether it menstruated regularly, the condition of its sex-skin, if it was then under treatment, and whether it had ever received treatment. The only facts supplied were the monkey's series' number and whether it had been allowed outdoors during the previous week, including the day of examination. It was felt that thus the vitiation of objectivity, clearly apparent in human clinical investigations of this nature in the past, might be avoided.

The most rigorous effort was made to confine the attention to the nasal appearance in a manner sincerely objective. Although it is to be regretted that owing to the nature and position of the examination site true objectivity of judgment is impossible, as no standard could be introduced for comparison, still it was felt that a truer estimate of reality would be possible if no observation were recorded unless it expressed unanimous opinion. In case of doubt the tendency to "mark down" the appearance was encouraged; thus if one observer was less impressed by a given degree of redness or swelling than the other two his marking was accepted. When there was a difference in colour of the two sides of the nose, in charting the observation the mean was taken, except in cases in which, after turbinotomy for histological examination, the visible parts of the conchæ had been replaced by scar tissue, and thus rendered useless as an index of colour change. Œdematous swelling, however, might be evident in it as the result of other changes in the non-visible part of the conchæ.

Abnormal redness and/or swelling was measured in three degrees. R.3 is an intense brilliant red of a vividness almost that of red typewriter-ribbon. R.2 and R.1 have also this characteristic quality, but are of less intensity. S.3 is applied to a middle concha when it is so swollen and œdematous that it seems to block the airway almost completely. In a lower concha the colour has not got the "brilliant" quality or vividness, but in R.3 it becomes a dusky, fiery red; or it may have a purple tint. Swelling is harder to see, apart from redness, in the lower concha. Both cause disappearance of the rugæ, but the glandular activity, the amount of mucous secretion, seem chiefly noticeable in the middle concha.


July August September 1
July August September October 2
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July August September October 4
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August. September. October. November. December. 6
July August September October November December 7
September October November December 8

Chart 1.—Monkey No. 885—adult female castrate, treated with keto-hydroxy-œstrin. **Chart 2.**—Monkey No. 2633—young adult female, œstriol-treated, 1 mg. in 10 per cent alcohol by mouth daily. **Chart 3.**—Monkey No. 2905—immature female, emmenin-treated, hypo. (300 d.u. b.i.d.). **Chart 4.**—Monkey No. 2632—young adult female, emmenin-treated by mouth. **Chart 5.**—Monkey No. 1295—adult female, untreated. **Chart 6.**—Monkey No. 1296—adult female, untreated. **Chart 7.**—Monkey No. 1299—cyclic adult female, untreated. **Chart 8.**—Monkey No. 2898—young adult female, untreated.

Material examined.—The colony consists of 28 animals. Three are males, 2 immature, and 1 adolescent; 5 are immature females, 4 are adolescent females (one a castrate), and 16 are mature females, of which 3 are castrates.

THE EFFECTS OF ADMINISTRATION OF ŒSTROGENIC HORMONES

Œstrone.—When nasal examinations commenced there were already 14 animals in course of treatment with œstrogenic hormones; these were studied, using the untreated remainder of the colony as controls. Two adult female castrates and one adolescent female castrate, treated with daily hypodermic injection of 500 gamma œstrone for 50 to 75 days, were examined during the last three to ten weeks of the period. Typical changes[14] were produced in the nipple, sex-skin, face and back. They were examined nasally twelve days after injection had begun, when the conchæ showed maximal redness (R.3) in one, and marked redness (R.2) in the other, this becoming maximal in about a week (Graph 1). The peaks were sustained for about two weeks, when, despite continued treatment, the colour steadily faded until about the time treatment was stopped it had reached normal level, preceding the fading of colour in the other sex-skin areas by about a week.

The adolescent castrate was seen only during the last two weeks of treatment when the nose showed marked reddening, as did also the nipple, face and sex-skin. Two intact adolescent females, treated similarly, were examined nasally only during the last two weeks of treatment. One showed abnormal redness on the three occasions examined, while the other did not; this does not mean, of course, that the nose may not have responded earlier in treatment.

Theelol (Œstriol).—A young adult female (Graph 2) and an immature male were treated daily with 1 mg. of Theelol in 10 per cent alcohol by mouth for seventy days, with weekly nasal examination throughout. Nasal reddening was maximal (R.3) in both animals after fourteen days' treatment, and in the female remained so for about two weeks, when it began to decline despite treatment, touching normal just before a menstrual period, which occurred on the forty-fourth day of treatment and lasted four days. After this the colour rose again during the last two weeks of treatment, and did not fall to normal till ten days before the next period. In the male animal the nasal response declined more rapidly, but marked variations in colour were seen for two months after treatment ceased.

Emmenin.—Three immature females (Graph 3) were treated with hypodermic injection of 300 day units twice daily, one for eighteen and two for forty-five days, with nasal examination throughout. The most mature animal showed maximal reddening, the two less mature, submaximal degrees. In all three increase in nasal colour was apparent a week after injections were begun. One adolescent female, given 1,000 units daily intramuscularly for one hundred days, whose nose was examined during the last forty days of the treatment, showed two maximal peaks of reddening, separated by an interval of twenty-four days.

Three animals (Graph 4) were given 1,000 units daily by mouth for periods of from fifty to ninety-five days. One, an immature male, showed a submaximal response at the thirtieth day of treatment which rapidly disappeared. This was synchronous with changes in the nipple and sex-skin. A young adult female (No. 2632) treated similarly for ninety-five days showed three submaximal peaks on the fifteenth, fifty-eighth and ninety-third days of treatment. An adult female castrate (No. 2265), treated for fifty days, showed a maximal nasal peak on the eighth day, and a submaximal one just before treatment ceased; castration was proved subsequently to have been incomplete.

One characteristic of the nasal response is worthy of note; it is most clearly evident and constant in the emmenin-treated animals, and much less frequently seen in those treated with the other hormones, namely periodic peaks in the colour response. With emmenin such peaks were found to occur, on the average, at intervals of about twenty-seven days (Table I). Emmenin is relatively inert in the castrate, the presence of the ovary probably being necessary for its most effective action.[15] Its effect upon the nasal mucosa may be regarded as enhancing the normal premenstrual peak (Graph 5), making more clearly evident the nasal evidence of sexual cyclicity (Graphs 3 and 4).

TABLE I.

THE INTER-PEAK INTERVAL IN NASAL ACTIVITY IN MONKEYS TREATED WITH EMMENIN

Monkey	*Peak intervals days*	*Average peak interval*
No. 2901	27	
	30	28 days
No. 2903	23	
	25	24 days
No. 2905	28	
	24	
	24	25 days
No. 2263	23	23 days
No. 2635	30	
	23	
	35	
	31	29 days
No. 2632	44	
	35	
	23	
	22	
	33	
	28	
	28	30 days
No. 2265 (incomplete castrate)	40	
		26½ days

Untreated females.—As a control group 12 females were examined under exactly similar conditions as the injected animals. Four were observed for eight months, 3 for seven months, 1 for six months, 2 for five and a half months, 1 for four months, and 1 for three months, those observed for the shorter periods being added to the series as time went on. At the beginning 7 were cyclic adults, while 5 were described as "immature". Of these last 3 were adolescent and developed the full cycle, with menstruation, during the latter half of the period of observation. One animal, examined for four months, remained immature and acyclic throughout. Two of the cyclic group menstruated irregularly. Only when the weekly state of the nose was charted on one-year paper, together with graphs of redness and/or swelling in the nipple, sex-skin, face and back, and also with the indoor and outdoor temperatures and observations as to whether or not the animal had been allowed out, did the following facts become apparent:—

1. The nasal variations are not significantly related to temperature variations.

2. There is a seasonal increase in the degree of colour of the nasal mucosa as well as in the degree of activity manifest in the several sex-skin areas, with which the former is coincident (Graphs 6 and 7). In the adults this occurs in September and October, at which season it is known that conception is most likely to take

place. In the "immature" group, however, this condition was best seen in November. This may be due to the fact that the series is very small (5 animals), or it may be that the adolescent animal responds somewhat more slowly to a seasonal stimulus (Table II).

TABLE II.

MONTHS IN WHICH THERE IS GREATEST ACTIVITY IN SEX AREAS

(Redness and/or Swelling, July, 1935 - February, 1936)

Cyclic Adult Females (Untreated)	*Aug.*	*Sept.*	*Oct.*	*Nov.*	*Dec.*
No. 1294		x	x	x	
No. 1295	x	x	x		
No. 1296	x	x	x	sl.	
No. 1297		x	x	x	
No. 1298	sl.	(regular and well marked activity)			sl.
No. 1299		x	sl.	sl.	
No. 1300		x	x		
	2 (1 sl.)	6	5 (1 sl.)	2 (2 sl.)	1 sl.
"Immature" Females (Untreated)	*Aug.*	*Sept.*	*Oct.*	*Nov.*	*Dec.*
No. 2898		x		x	x
No. 2899		x	x	x	
No. 2900			x	x	
No. 2902				sl.	
No. 2904				x	x
		2	2	4 (1 sl.)	2

x Indicates outstanding activity in sex-skin, nipple, face and nose.

sl. Indicates activity above other months, but not so marked as in x.

3. In the untreated cyclic female monkey there are periodic peaks in nasal mucosa colour and activity, most marked in September and October and least in January and February (Graphs 5, 6, 7). The peak-intervals vary in length in different animals; in the group they averaged 28 days. In the animal in which they were shortest, the average was 21 days, and in the animal in which they were longest, 33 days. In the group there was a total of 52 "monkey-months" nasal observation and 45 "nasal peaks" were seen (Table III). In 89 per

TABLE III.

IN 45 NASAL PEAKS OBSERVED IN CYCLIC MONKEYS THERE WAS CO-EXISTENT ACTIVITY IN THE OTHER SEX-SKIN AREAS AS UNDER:

	Cases	*Percentage*
Face	31	68.8
Nipple	40	88.8
Back (swelling)	13	28.8
Sex-skin	38	84.4

cent of these there was coincident nipple activity, in 84 per cent sex-skin activity, in 69 per cent activity in the face, and in 28 per cent activity in the back (swelling). Finally, such nasal peaks were 8 per cent more regular as a manifestation of sexual cyclicity than uterine bleeding (Table IV). They were found to occur "pre-

TABLE IV.

CYCLIC ADULT FEMALES (UNTREATED)

		Percentage
Total "monkey-months" observation	52	
Total menstrual periods	41	79
Missed menstrual periods	11	21
Total nasal peaks	45	87
Missed nasal peaks	7	13

Nasal activity in adult cyclic monkeys is 8 per cent more constant than menstruation in indicating the sex cycle.

menstrually" in 60 per cent, coincident with the bleeding in 16 per cent and "post-menstrual" in the remainder (Table V). We also observed in a number of instances

TABLE V.

RELATIONSHIP OF THE NASAL-ACTIVITY-PEAK TO MENSTRUATION — "ADULT MONKEYS"

	Cases	*Percentage*	
"Premenstrual"	23	60.5	76.2
Coincident with flow	6	15.7	
Postmenstrual	9	23.8	

that the nasal redness peak in a given month might be double, with a remission, synchronous with a double peak in sex-skin coloration, in an intermenstrual interval (see November, Graph 6).

In the immature untreated group of 19 "monkey-months" observation 13 nasal peaks were observed (Table VI). Their intervals were more irregular and

TABLE VI.

"IMMATURE" FEMALES (UNTREATED)

		Percentage
Total "monkey-months" observation	19	
Total menstrual periods	10	52.6
Missed menstrual periods	9	47.4
Total nasal peaks	13	68.4
Missed nasal peaks	6	31.6

Nasal activity in "immature" female monkeys is 16 per cent (15.8) more constant than menstruation in indicating the sex cycle.

somewhat longer than in the adult group, averaging over 30 days; with 77 per cent of them there was coincident nipple activity, in 69 per cent also sex-skin and face activity, and in 1 case was there also swelling of the back (Table VII). Irregular menstruation or amenor-

TABLE VII.

IN 13 NASAL PEAKS OBSERVED IN "IMMATURE" FEMALE MONKEYS THERE WAS CO-EXISTENT ACTIVITY IN THE OTHER SEX-SKIN AREAS AS UNDER:

	Cases	*Percentage*
Face	9	69.2
Nipple	10	76.9
Back	1	7.7
Sex-skin	9	69.2

rhœa was more frequent than in the adult, which accounts for the fact that in this group the nasal peaks were 16 per cent more regular as a manifestation of the

sexual cycle than uterine bleeding. As regards their position in the cycle (Table VIII), more than half of

TABLE VIII.

RELATIONSHIP OF THE NASAL-ACTIVITY-PEAK TO MENSTRUATION—"IMMATURE" MONKEYS

	Cases	*Percentage*	
"Premenstrual"	4	57	100
Menstrual	3	43	
Post-menstrual	0		

Only 7 nasal peaks out of 13 (53.8 per cent) can be related to a menstrual bleeding.

them were clearly "pre-menstrual", while the remainder continued or occurred while bleeding was taking place; none were "post-menstrual". Owing to amenorrhœa only half the peaks could be related to menstrual bleeding.

DISCUSSION

We should like to make it quite clear that in a cyclic untreated animal, even after months of practice in nasal examination, none of the observers are of opinion that a single nasal examination would enable him to state with certainty the time in the cycle at which the inspection is made, due to the great variation in colour from animal to animal; but they are convinced that observations made over a period of several months will reveal variations that will assume significance when charted with graphs of activity in the other sex-skin areas. It is in this respect that the female monkey is superior to the human female as an object of observation in this problem. In woman, where the cycle, if amenorrhœa is present, is not clearly defined, use could be made of sex hormone excretion assay in the urine.

The œstrin dosage necessary to elicit the nasal response.—Since in the preliminary investigation large doses of the three œstrogenic hormones had been given for relatively long periods it was desirable to ascertain the smallest dose of œstrin capable of producing the characteristic effect on the nasal mucosa. For this purpose 10 of the females that had been examined throughout as controls for a period of about 5 to 6 months were first used in December and January. They presented the advantage of a very complete past record of both nasal and sex-skin activity, and the seasonal variation was then at its ebb. This might be considered as a disadvantage if the hypothesis were entertained that at that time the animals' responsiveness to œstrin might be less, but, on the other hand, it was felt that the observation of sudden activity at a time when the mucosa was apparently less active might gain in significance, especially if the dosage were small.

The doses given were 12.5, 25, 50, 100, 150 and 200 gamma. At the usual weekly examination of the colony these animals were mixed in with the others, so that the examiners could not identify and give them special scrutiny. After seven days' treatment all, except those given 12.5 gamma, whose colour was a high normal, showed a positive response, which increased with a further week's treatment, the reaction with the 12.5 gamma dose still being in doubt, since by the system of rigorous marking, the identity of the monkey not being known, a high normal or doubtful positive was deprived of any benefit of doubt and marked "normal".

Treatment was stopped, and when the nasal appearances had been steadily normal for some time, after about a month the treatment was repeated, when it became evident that with the same dose the animals did not react so well and it had to be increased 50 to 100 per cent to produce an equivalent effect. With the smaller dosage, smaller when compared with the early massive doses given, it was observed that the nasal reaction was somewhat changed in character; the redness was not so vivid and there was evidence of greater glandular activity, the mucosa appearing highly glistening and there being some clear discharge, which, however, never had any purulent quality.

Seven females, which had been treated with massive doses of œstriol or emmenin in the first survey, and had been allowed to recover and remain without treatment for three months or more, being under observation the whole time, were similarly treated. With a dosage of 25 gamma and upwards all gave the typical reaction.

In general, it must be said that there are a number of factors that complicate the question of the amount of crystalline œstrin necessary to effect nasal response, when injected hypodermically dissolved in corn oil. First, the sex of the monkey (females respond more readily); second, the age of the animal, whether it is sexually mature; and, third, whether or not it has recently been treated with an œstrogenic substance. It would appear that the previously untreated adolescent animal that is approaching maturity is the best test object. Very immature animals do not respond so well in any of the sex-skin areas, including the nose, and animals that have been mature for some considerable time and have shown a spontaneously rich coloration may possibly have small degrees of change, which are masked by the spontaneous coloration; or

they may have reached the maximal response beyond which change towards increase is very hard to evaluate. Fourth, the season of year at which the experiment is conducted; in autumn the animals are apparently more sensitive, but change is harder to see, since they are already highly coloured; whereas in January and February they would appear to be less sensitive, although changes are more easily seen. Finally, complications arise from the nature of the nasal site that it is difficult to see, and an artificial light has to be used of a certain intensity, so that one cannot be certain of slight degrees of change that might readily be seen on an external genital sex-skin. Besides this there is the attitude of the observer, who, with the animal's identity concealed from him, is most unwilling to compromise his judgment by recording as possibly abnormal anything which is not very clearly so. These facts must all be born in mind when the minimal effective dose is shown as being in the region of 25 gamma daily, for a week. At this time we treated the castrate monkeys for two weeks with very large doses of potent anterior pituitary gonadotropic hormone. We were able to record no significant change in the nasal mucosa.

Histological examination after turbinotomy.—Turbinotomy was performed on 16 animals showing varying degrees of change at different stages of treatment. The operation, from the histological standpoint, is unsatisfactory, since a nasal punch, even though it is the smallest available for human use, can only be introduced into the monkey's nose with difficulty, and it has to be used blindly; thus it is hard to be sure of getting a fair sample of tissue. At first, an attempt was made to get samples from both conchæ; later the middle alone was used. Fixation was in formalin and decalcification in 5 per cent hydrochloric acid.

Since the operation was done, in the main, for such clinical appearances as hyperæmia and swelling it is obvious that such treatment of small pieces of tissue, by the marked shrinking it causes, is apt to obliterate, or at least seriously to diminish, the histological confirmation of the clinical state. The histologist therefore has to base his opinion largely on the presence or absence of definite perivascular œdema in the submucosa. This he was able to find in about two-thirds of those which had shown abnormal redness and swelling. The histological appearance in a well marked case is shown in Plate 2 "A", from an animal treated for two weeks with 1,000 gamma of œstrone. The clinical appearance was "R.3". The chief change occurs in the connective tissue of the cavernous septa, where the œdema is severe, spreading out the fibres, a change very similar to that found in the corium of the sex-skin, with œstriol treatment;[14] young fibroblasts can also be seen, especially adjacent to the basement membrane.

SUMMARY

1. The nasal mucosa of the intact monkey (*Macaca mulatta*) responds to the administration of œstrogenic hormones, crystalline Œstrone and Œstriol, and Emmenin in the manner of, and synchronously with, the changes known to occur in the nipple, sex-skin, face and back.

2. The response is most clearly seen in the "middle" and inferior conchæ which show reddening and/or swelling. It is a specific response.

3. The substances mentioned are effective in males as well as females, in both immature and adult animals.

4. The effect can be produced in female castrates by Œstrone and Œstriol.

5. It has not been obtained in castrate females with pituitary gonadotropic hormone.

6. The histological changes are similar to those known to be produced in the sex-skin of this animal by Œstriol.

7. In the untreated immature and adult female animal peaks of nasal activity periodically occur normally at intervals of about 28 days; the peaks are chiefly "pre-menstrual" in time.

8. Such naturally occurring cyclical activity in the nose is most marked in the autumn months, when conception is most likely to occur.

REFERENCES

1. MACKENZIE, J. N.: Irritation of the sexual apparatus as an etiological factor in the production of nasal disease, *Am. J. M. Sc.*, 1884, **87:** 365.
2. FLIESS, W.: Die Beziehungen zwischen Nase und weiblichen Geschlechtsorganen in ihrer biologischen Bedeutung, Leipzig & Wien, F. Deuticke, 1897.
3. MORTIMER, H. AND WRIGHT, R. P.: The effect of œstrogenic hormones on the nasal mucosa; their rôle in the naso-sexual relationship, and their significance in clinical rhinology, *Canad. M. Ass. J.*, 1936, in press.
4. KOBLANCK AND ROEDER, H.: Animal experiments on the influence of the sexual system by nasal interference, *Berlin. klin. Wchnschr.*, 1912, **49:** 1893.
5. KARPOW, N.: Zur Frage des Zusammenhangs der Nase mit der Sexualsphäre, *Monatsschr. f. Ohrenh.*, 1929, **63:** 758.
6. NEMOURS, P. R.: Effect of experimental bi-lateral turbinectomy on the development of the testes in the rat, *Arch. Otolaryngol.*, 1935, **22:** 626.
7. BIEDL, A.: Internal Secretory Organs, John Bale, Sons and Danielson, Ltd., London, 1912.
8. BORGHESAN, E.: Alterazioni dello scheletro e della mucosa nasale in un caso di ipofunzione ovarica (quoted by Pighini and Porta).
9. PIGHINI, G. AND PORTA, C. F.: L'azione reintegrativa degli estratti anteipofisari ed ovarici sulle alterazione sperimentali della mucosa ed ossa nasali da castrazione, *Il Valsalva*, 1934, **10:** 140.

10. WIRABOFF, A.: Relations entre la muqueuse du nez et l'activité fontionelle des glandes génitales: Recherche Expérimentale, *Rev. de Laryng., etc.*, 1934, **55**: 896.
11. SMITH, C. G. AND CRAIGIE, E. H.: The association of a pathological change in the olfactory nasal mucosa with the occurrence of "stunted" olfactory bulbs, *Trans. Roy. Soc. Canada*, May, 1936.
12. SCHAEFFER, J. P.: The Nose, Paranasal Sinuses, Nasolacrimal Passageways, and Olfactory Organ in Man, P. Blakiston's Son & Co., Philadelphia, 1920, p. 265.
13. MAXIMOW, A. A.: A Textbook of Histology, W. B. Saunders Co., Philadelphia, 1930, p. 436.
14. BACHMAN, C., COLLIP, J. B. AND SELYE, H.: The effects of prolonged œstriol administration upon the sex-skin of *Macaca mulatta*, *Proc. Roy. Soc. Lond.*, 1935, Ser. B., No. 802, **117**: 16.
15. BROWNE, J. S. L.: The chemical and physiological properties of crystalline œstrogenic hormones, *Canad. J Research*, 1933, **8**: 180.

STUDIES IN MINERAL METABOLISM*

II. CALCIUM AND THE KIDNEY: EXPERIMENTAL I.

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IN previous papers[1, 2] some of the lesions in the human kidney resulting from excessive calcium excretion were described. Further, it was suggested that the kidney lesions in some cases of renal rickets and of chronic pyelonephritis are primarily the result of injury by calcium. To study the natural history of mineral injury of the kidney we have undertaken experimental studies on animals. In the present series of papers will be recorded certain lesions produced in the kidneys of white and hooded rats after the injection of Collip's parathyroid extract. This work diverges from that of earlier observers.[3, 4, 5] For convenience of presentation the lesions will be described in the following order: (1) Intratubular and interstitial deposit of calcium and its removal; (2) parenchymal and interstitial reactions; (3) end-results; chronic kidney disease. The present paper deals with the details of the experimental procedures and with the first of the above group of lesions.

The rats.—We have used two strains. The first, albinos, the original stock of which was kindly supplied us by Prof. A. T. Cameron, has some tendency to a simple hydronephrosis and hydroureter. Marked hydronephrosis has occurred in about 1 in 200 rats, and mild in about 1 in 25. We have observed no natural tubular dilatation except in association with extreme hydronephrosis. The second strain, of Norwegian hooded rats, was kindly supplied us by Dr. Roy McCullagh, of the Cleveland Clinic. We have seen no congenital anomalies in these. They are more resistant to the bad effects of parathyroid extract than are the albinos. The lesions produced in them by injection of the extract are the same in type as in the first strain but less in degree.

Plan of injection.—With two exceptions injections of all litters were begun when the rats were five days old. In the exceptions they were started on the third day. In early series all injections were given once daily subcutaneously. In more recent series intraperitoneal injection has been found simpler. Under treatment the rats nursed badly or not at all. The mortality was so high that a plan of interrupted injection was followed, thus: n units a day for 5 days, followed by 5 days to recuperate, $n+1$ units a day for 5 days, 5 days' rest to recuperate, and so on up to a maximum of six injection periods. Then longer rest periods were given, two to four weeks, a week of injection, again a rest of four weeks, and so on. In this way the animals had time to recover from the ill effects of the extract. We think the time lapse probably important in the production of the lesions to be described. The minimum initial dose at 5 days was ½ unit, the maximum initial dose 5 units, the most satisfactory for our animals, 2 units. Animals were killed each 24 hours, and after each various dose in the early periods; after each period of injection, in the later one. Litter mate control was not possible. If only half a litter was injected the normal mates were so much more vigorous than the experimental animals that the latter had little chance of survival. We have obtained controls by killing whole litters, or individuals from litters, at various ages.

Diet.—Injections were started while the rats were nursing. They were weaned at 21 to 25

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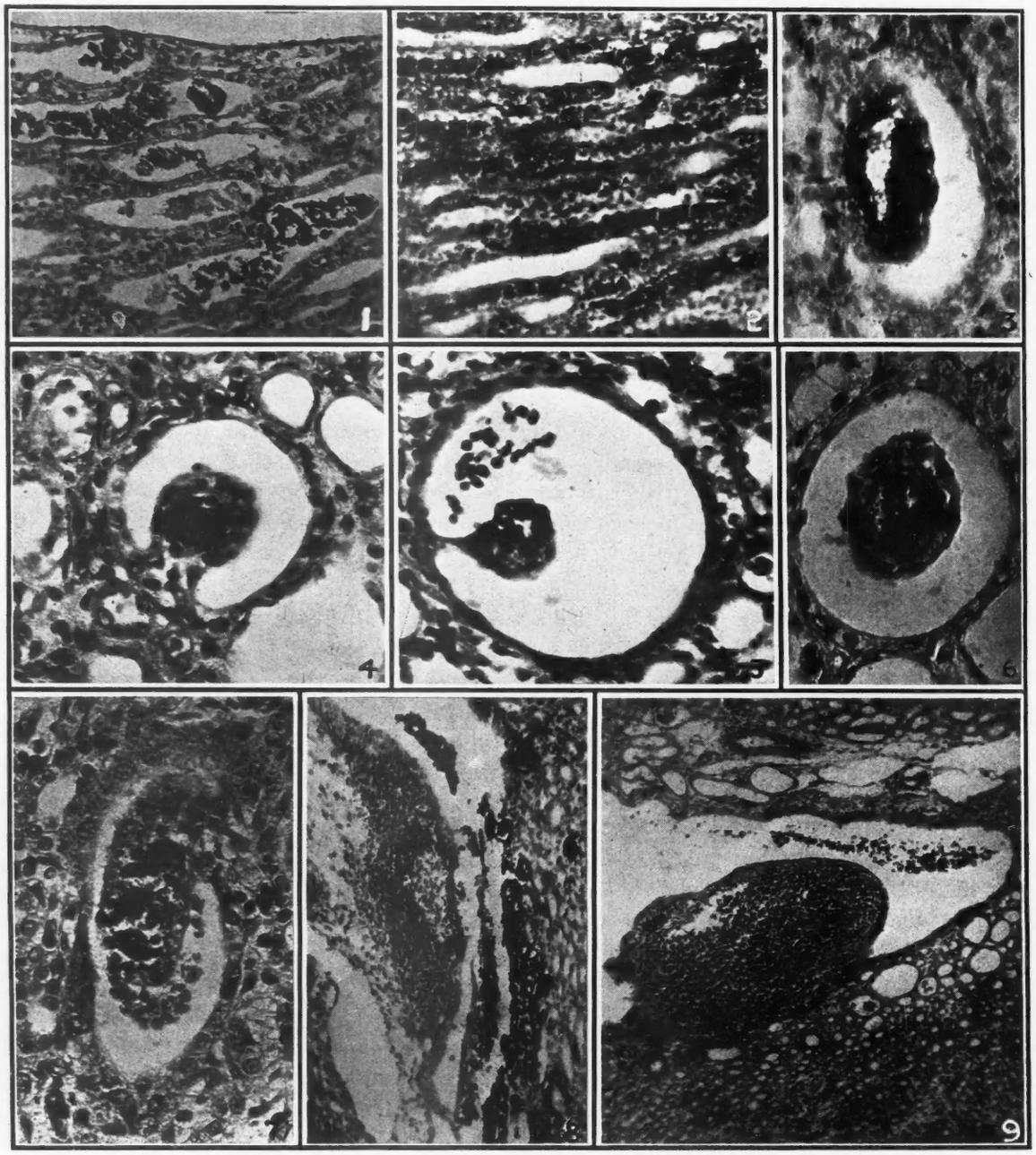

Fig. 1.—Calcium and albumin in collecting tubules. No inflammatory response. Rat 38. Six days old; one day after injection of 5 units of parathyroid extract. Magnification 100 x. Stain in all sections, silver nitrate, hæmatoxylin and eosin. **Fig. 2.**—Sharply circumscribed, columnar, coarse, crystalline paratubular deposits of calcium. Rat 40. Eight days old; one day after injections of 5 units a day for 3 days. Magnification 100 x. **Fig. 3.**—Paratubular calcium deposit beginning to push into dilating tubule. Note that the calcium is surrounded by epithelium. Rat 47. Twenty-eight days old; injections, beginning at 3 days, 2 units a day x 5; 5 days' rest; 3 units a day x 5; 5 days' rest; 4 units a day x 5. Magnification 400 x. **Fig. 4.**—The extruding calcium has carried the epithelium of the tube with it, forming a mesentry; tubule dilated. Rat 19 P 7. Fifty-one days old; injections, beginning at 5 days, 2 units a day for 3 days, 3 days' rest; 3 units a day for 3 days, 3 days' rest; 4, 5, 6, 10 units over period of 4 days, 3 days' rest; 10 units a day for 3 days, 24 days' rest, killed accidentally. Magnification 400 x. **Fig. 5.**—A step further than that in Fig. 4. Rat 48. Thirty days old, having had one more rest period than rat 47, then 5 units a day x 5. Magnification x 300. **Fig. 6.**—Epithelium covered, calcium mass lying free in tubule. Same rat as in Fig. 3. Magnification 400 x. **Fig. 7.**—Mass of calcium carrying tubular epithelium with it. Pus covering tip of extrusion. Tubule dilated. Rat 30. Ten days old; one day after injection of 3 units a day for 5 days. Magnification 400 x. **Fig. 8.**—Fornix of pelvis with calcium in and around tubules of the pyramid, and also under the pelvic mucosa opposite the pyramid. The latter mass is infiltrated with leucocytes and is pushing the pelvic epithelium before it. Rat 56. Seven days old; one day after 3 units daily for 2 days. Magnification 60 x. **Fig. 9.**—Step further than that seen in Fig. 8. Rat 58. Nine days old; one day after 3 units daily for 4 days. Magnification 60 x.

days. At first we used a basal diet of brown bread and milk *ad libitum*, with cod liver oil, one drop daily, lettuce every other day, and liver occasionally. Latterly we have used biscuits called "purina dog chow", and lettuce. The biscuits contain 1.5 grams of calcium and 1.0 grams of phosphorus per 100 grams dried weight. They are satisfactory for growth and reproduction.

Autopsy and histological methods.—Some animals died in the night and were examined early the next day. The remainder were killed with ether, opened and examined at once, and the tissues removed and fixed in 10 per cent formalin. These were blocked in paraffin, stained with 1 per cent silver nitrate, hæmatoxylin and eosin. Black or brown black deposits were interpreted as calcium. Cultures and microscopic examinations of bladder urine were made in the larger animals. Practically without exception the urine was sterile.

General Results

Definite deposit of calcium was usually not produced with a single injection of less than 2 units. A single dose of from 2 to 5 units produced deposits with regularity, but the type of deposit could not be exactly foretold from the size of the dose used. There was a fair degree of uniformity throughout any one litter, but variation from litter to litter. It was repeatedly observed that, of two litters starting injections at the same age and weight and on the same dose, one would peak and pine and wither away, while the other sucked, held their weight during the periods of injection, and gained rapidly during the rest periods. It was also observed that one type of lesion might predominate throughout a whole litter. This may have been due to a congenital tissue predisposition, or to the difference in feeding habits, or to variations in the chemical composition of rat's milk.

Large doses of parathyroid extract were followed within 3 minutes by nervous hyperexcitability which sometimes proceeded to generalized convulsions lasting as long as 27 minutes.[6]

Particular Lesions

1. *Intratubular deposit.*—Within 24 hours of the first injection of 2 to 5 units much of the calcium lay in finely divided particles within tubules, usually the collecting tubules (Fig. 1). There was no associated cellular reaction. In spite of continued daily injections the calcium rapidly disappeared. This is histological confirmation of Pugsley's[7, 8] chemical observations on the urinary excretion of calcium under the influence of parathyroid extract injection. Calcium was not seen in the glomeruli or in the cells of the tubular epithelium.

2. *Coarse, circumscribed, interstitial deposits.*—Sometimes in the first 24 hours, more regularly on the second and succeeding days, with the above dosages, calcium began to concentrate in small but dense crystalline masses close to the tubules. The masses were less numerous and smaller in the cortex than in the medulla, where they frequently formed solid radiating cords (Fig. 2). These cords were so sharply limited we felt certain that they lay within some type of vessel. We suggest they were in lymphatics, just as the same suggestion was made about calcium deposits in babies' kidneys.[1, 2] Most of this calcium disappeared within 15 days of the first injection. In some cases a little remained for as long as 52 days after the first injection. Part was removed by means of a foreign body cellular reaction, part extruded into the tubules.

3. *Extrusion of calcium into tubules: pus formation.*—A remarkable phenomenon, possibly of importance in the formation of gravel and stone, was repeatedly observed in connection with some of the paratubular deposits. The epithelium overlying calcium might be seen to protrude a little into the lumen. By degrees it advanced, the calcium close behind, (Fig. 3). The tubules dilated like a cœlomic cavity. The solid cord of calcium carried the tubular epithelium before it, as fetal gut carries peritoneum; behind it the epithelium formed a "mesentery" (Fig. 4). The mesentery disappeared, leaving a small, solid, calcium-filled, epithelial tube or ball lying free in a larger tube (Fig. 6). We do not know what became of these extrusions. Leucocytes were frequently observed collected on the surface of these extruding masses (Fig. 7) or passing through the intact neighbouring epithelium. Pus was found in tubules here and elsewhere within 48 hours of first injections. The frequent occurrence both here and also in association with peripelvic deposits is particularly noted in its possible bearing upon chronic pyelonephritis in the human.

4. *Fine, diffuse, interstitial deposits of calcium.*—In addition to the coarse, crystalline,

linear, paratubular deposits there were less common, diffuse, interstitial ones of a fine dust-like character. These occurred chiefly in the following sites: (*a*) at or near the tip of the pyramid, (*b*) in an arc at the cortico-medullary junction, and (*c*) under the pelvic mucosa opposite the pyramid. These we believe were more fleeting than those described in section 2. In the pyramid they often completely surrounded tubules, outlining them sharply, sometimes collapsing them by pressure. Sometimes they were associated with a type of massive, acute, tubular dilatation to be described in our next paper. When they occurred under the pelvic mucosa they sometimes underwent a process of extrusion into the pelvis, accompanied by exudation of leucocytes, similar to the above described tubular extrusion (Figs. 8 and 9).

SUMMARY

A procedure in the study of the effect of increased mineral excretion upon the kidney of rats is outlined. Some of the early lesions of deposition and disappearance of calcium are described.

The microphotographs illustrating this article were kindly taken by Miss Nason, of the Department of Pathology of the University, by permission of Dr. William Boyd.

REFERENCES

1. CHOWN, B.: Renal rickets and dwarfism: A pituitary disease, *Brit. J. Surg.*, 1936, **23:** 552.
2. CHOWN, B.: Studies in mineral metabolism. I. Calcium and the kidney: clinical, *Canad. M. Ass. J.*, in press.
3. HUEPER, W.: Metastatic calcifications in organs of dog after injections of parathyroid extract, *Arch. Path. & Lab. Med.*, 1927, **3:** 14.
4. SMITH, M. I. AND ELVOVE, E.: Action of irradiated ergosterol in rabbit, *U.S. Pub. Health Rep.*, 1929, **44:** 1245.
5. JOHNSON, J. L.: Experimental chronic hyperparathyroidism; effects of administration of irradiated ergosterol, *Am. J. M. Sc.*, 1932, **183:** 776.
6. ELLSWORTH, R. AND HOWARD, J. E.: Studies on physiology of parathyroid gland: some responses of normal human kidneys and blood to intravenous parathyroid extract, *Bull. Johns Hopk. Hosp.*, 1934, **55:** 296.
7. PUGSLEY, L. I.: Effect of parathyroid hormone and of irradiated ergosterol on calcium and phosphorus metabolism in rat, *J. Physiol.*, 1932, **76:** 315.
8. PUGSLEY, L. I. AND SELYE, H.: Histological changes of bone responsible for action of parathyroid hormone on calcium metabolism of rat, *J. Physiol.*, 1933, **79:** 113.

CERTAIN INTERESTING CASES OF HÆMATURIA

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THE significance of hæmaturia as a symptom is being repeatedly impressed on the rank and file of the profession, largely because of its importance as a symptom of new growth. The real need of this is apparent to anyone who sees a number of these cases and is aware that a large percentage have symptoms for an unduly long period before they come for diagnosis. Apart from tumours, hæmaturia is a concomitant symptom of many of the common urinary diseases, but it may also be a predominant symptom of diseases so unusual and so elusive as to tax the patience of both the urologist and his client. The following cases will afford abundant proof of this, and are, I think, of unusual interest.

CASE 1

A male, aged 46, admitted November, 1934. This patient complained of hæmaturia which had been absolutely continuous for ten years. The bleeding had been sufficient to make the urine dark red and was quite painless, except at rare times when he would have a dull colicky pain in the left flank, which was always followed by the passage of small clots. Shortly after the onset he had several examinations by competent urologists who told him that the blood was coming from the left kidney but that they could not demonstrate any lesion and had advised him to carry on. He had taken this advice, and had become accustomed to the bleeding, and it was not until a few months before admission that he had begun to lose strength. Finally, increasing weakness, with shortness of breath, had forced him to give up.

On admission the man was thin and pale; pulse, 90; blood pressure, 110/70. He was obviously suffering from a very severe anæmia. Blood count: red blood cells, 3,200,000; white blood cells, 5,000; hæmoglobin, 50 per cent: the smear showed a few nucleated reds but was otherwise normal. No disease could be made out on general examination. Neither kidney was palpable. There was no tenderness in either loin. The bladder was not distended or tender; the prostate was normal. His blood Wassermann test was negative and blood chemistry normal. The voided urine was dark red, with red blood cells so numerous as to obscure the other elements. Cystoscopic examination showed a normal bladder. Dark bloody urine was seen coming from the left ureter and clear urine from the right. The ureters were easily catheterized, and good specimens obtained confirmed this. X-ray with catheters showed no evidence of stone. Bilateral pyelograms showed normal renal pelves and normal calyces on either side. The left renal pelvis was lavaged with 1 per cent silver nitrate.

Nephrectomy was advised in order to prevent exsanguination. He refused and went home. Six weeks later he returned, his condition still worse than at the time of his discharge. He now wished to be operated upon. A second cystoscopic examination confirmed the previous findings and nephrectomy was carried out. A perfectly normal kidney was easily removed. An intensive gross and microscopic examination was undertaken, but no lesion could be demonstrated. Complete bacteriological examination gave sterile cultures. He made a rapid recovery and is today in perfect health.

The unique features of this case are the duration and intensity of the hæmaturia, the ability of the patient to carry on so long, and the absence of any demonstrable lesion in the kidney. Such cases are recognized, and many theories have been advanced as to the causation. Dr. Miller,[1] our pathologist, believes that the hæmaturia is due to localized inflammation of the calyx papilla angle, and has been able to demonstrate this in some cases. In this case, careful examination of the calyx shows some catarrhal inflammation with hæmorrhage into the tissue at one point. I am not certain, however, that this may not have resulted from operative manipulation. Dr. Rhea, of the Montreal General Hospital, believes that the hæmorrhage is due to varicose veins in the pelvis which quickly collapse following the removal of the organ, and their presence is thus overlooked. The bleeding in this case was so profuse as to suggest an open vessel, but, even so, it is remarkable that clotting did not take place, with cure, over so long a period.

Infections of various sorts have been blamed for such cases, and we have all seen them clear up after lavage with silver nitrate. I can recall one case of intermittent bleeding of five years' duration in which no pathological condition could be demonstrated, when the bleedings permanently ceased after one such treatment. Smith[2] reports a case in which nephrectomy became necessary to prevent exsanguination. Examination showed a simple ulcer of the upper calyx. He suggests that it might have been cured by silver nitrate. It is possible that various factors are responsible in different cases, but none satisfactorily explain this one.

CASE 2

A male, aged 40, admitted Dec. 10, 1935, complaining of hæmaturia of three weeks' duration. He had no associated symptoms and his general health was good. Nothing abnormal could be made out on general examination. The urine was dark red in colour, showed albumin, one plus, and many red blood cells; no pus or casts. Neither kidney was palpable or tender. The bladder was not distended; prostate normal; genitalia normal. Cystoscopic examination showed an absolutely normal bladder. The ureteral orifices were normal. Bloody urine was seen coming from the left, clear urine, from the right, ureter. Catheters passed each ureter with ease, and specimens were obtained which confirmed the cystoscopic examination. X-ray with catheters showed no stone. The right pyelogram showed a normal pelvis, with normal, well-defined calyces: the left pyelogram showed a normal pelvis with normal lower calyces. The upper calyces, and in fact the whole pelvis gave the impression of flattening-out, suggesting tumour. The man was discharged for further observation. He was readmitted on January, 1936, because of persistent bleeding, and nephrectomy was carried out. The kidney was easily removed, and, grossly, appeared absolutely normal, but on careful sectioning showed a small tumour in the region of the upper calyx (Fig. 1). The tumour was whitish and firm with no definite limiting capsule. Microscopic examination shows the characteristics of a simple fibroma.

Fibromata of the kidney are ordinarily small and of little clinical significance, being accidental discoveries at autopsy or operation. It is fortunately so, since when they do give rise to the usual signs of tumour, as in this case, their nature cannot be detected and treatment may be unnecessarily radical. On the other hand, since the great majority of kidney tumours are highly malignant, a patient with persistent bleeding and a pyelographic defect suggestive of tumour, even though small, should be looked upon with grave suspicion. If one waits for the classical signs of hæmaturia, pain, and tumour, treatment offers little hope of cure.

CASE 3

A male, aged 26, admitted November, 1932. This patient came complaining of hæmaturia which had come on spontaneously the day previously, had lasted a few hours, and disappeared without associated symptoms. He had never had any urinary trouble before, and his previous health had been good.

General examination was negative. Neither kidney could be palpated, and there was no tenderness in either loin. The bladder was not distended or tender. The external genitals normal. The prostate, per rectum, was normal, though very sensitive. The urine on admission showed a trace of albumin and an occasional red blood cell, no pus or casts. Cystoscopic examination showed a perfectly normal bladder with normal ureteral orifices. The ureters were easily catheterized and clear urine was obtained from each side. He was very sensitive to manipulation. X-ray with catheters in position showed no evidence of stone. Bilateral pyelograms showed a perfectly normal left renal pelvis; the right showed a small filling defect in the middle calyx, suggesting tumour. (Fig. 2). He was discharged for further observation.

The man was readmitted in January, 1933, complaining of some frequency of urination and stating that he had had a couple of slight attacks of hæmaturia since his previous examination. His general condition was unchanged. The voided urine showed a few scattered pus cells and red blood cells. Cystoscopic examination, with pyelograms, was carried out as before, with exactly similar findings. Because of the frequency and presence of a few pus cells, examination of the urine for tuberculosis was carried out. Nothing was found on direct examination, so several guinea pigs were injected during the next few weeks. In April one of the pigs died and autopsy showed generalized tuberculosis. The patient was again admitted to the hospital. He had lost a little weight during the winter, and complained of fatigue. Frequency had increased to four to five times during the night and every one to two hours during the day. The urine showed scattered pus cells, red blood cells, and acid-fast bacilli could now be demonstrated on direct examination. Cystoscopic examination was disappointing, in that the bladder still appeared normal and there was no change in the appearance of either orifice which might give one a clue as to the affected side. Indigo-carmine, given intravenously, appeared on both sides in three minutes and in equal concentration. Pyelograms again showed practically the same result as in previous examination.

After much hesitation nephrectomy was decided upon and the right kidney removed. This appeared entirely normal and the ureter was not thickened. On section, a cavity the size of a pea was found in the vicinity of the middle calyx. It contained thin pus and large numbers of acid-fast bacilli. No other lesion was demonstrable. The patient picked up slowly, and after nine months' rest, recovered his normal health.

This case is unusual, I think, in that such a small lesion should produce a pyelographic defect of this type, and also in that no changes occurred in the cystoscopic picture of the orifice on the affected side as the disease progressed. There must certainly have been an increasing number of organisms coming down the ureter for at least three months. There are some who might insist that he would have recovered without the operation if he had had a similar period of rest. Most urologists do not believe tuberculous lesions heal spontaneously, though the recent work of Medlar would tend to prove that this is entirely possible and does occur in some instances. Bugbee[3] reports two cases in which kidneys definitely proven to be tuberculous were ultimately removed; both were completely destroyed and contained multiple cyst-like cavities. Most painstaking examination showed no evidence of active disease, yet it gave every evidence of an arrested tuberculosis. Only this week I examined a patient who came in with hæmaturia of recent onset as his only complaint. Examination showed pus, blood and tubercle bacilli from the right kidney, with normal urine from the left. The function of the right, as determined by indigo-carmine, was approximately one-half that of the left. These findings would suggest an unilateral tuberculosis, but bilateral pyelograms show peculiar contracted calyces with distorted pelves on each side. May the left kidney not be the seat of an arrested tuberculosis?

CASE 4

A male, aged 40, admitted November, 1931. This patient complained of having had during the previous week two severe attacks of colic in the right loin, with hæmaturia so profuse that he had difficulty in emptying his bladder. The pain had been so intense as to require morphine, and a diagnosis of calculus had been made.

On examination, the patient looked well and his general health was excellent. The kidneys were not palpable; no tenderness in either loin. The bladder was not distended; no tenderness. The external genitals were

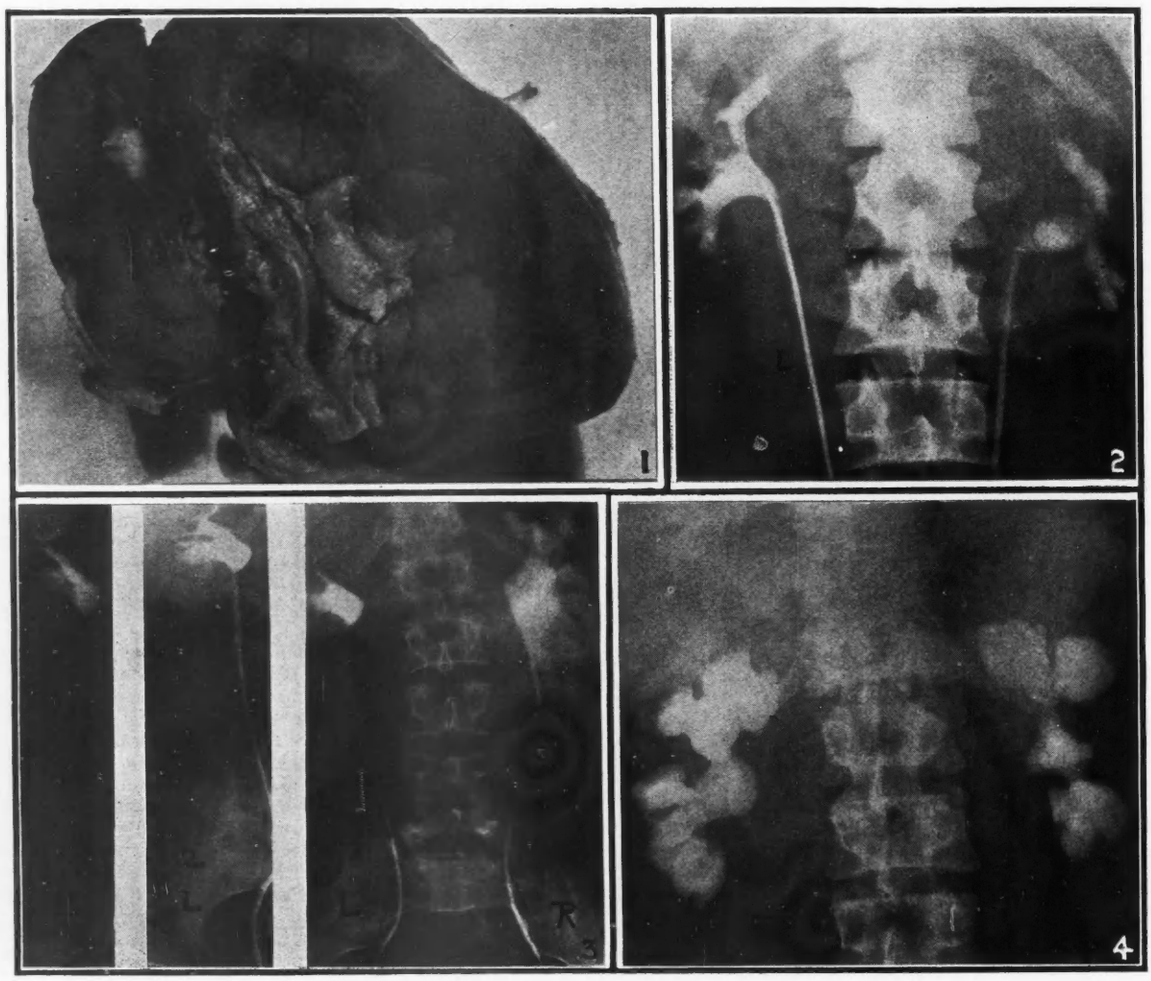

Fig. 1.—Upper half of kidney showing the tumour and its relation to the upper calyces. **Fig. 2.**—A normal left renal pelvis and calyces. The right renal pelvis presents a peculiar fusiform appearance with obliteration of the middle calyx. **Fig. 3.**—A large hydronephrosis on the right side and the progressive changes in the left renal pelvis over a period of two years. **Fig. 4.**—Enormous renal calculi completely filling the pelves and calyces on both sides.

normal. The urine was, grossly, clear, and on microscopic examination showed only a few red blood cells. Cystoscopic examination showed an entirely normal bladder, normal ureteral orifices; the ureters were easily catheterized and clear urine came from each side. X-ray with catheters in position showed no evidence of stone. The left pyelogram showed a normal pelvis and upper calyces with a small filling defect in the lower calyces suggesting tumour. The right pyelogram showed a greatly dilated renal pelvis with large broad calyces (Fig. 3). This finding was so surprising that further enquiry was made as to the symptoms on this side, but none could be elicited.

No treatment was carried out, and the patient was lost sight of for two years. During this interval he did his work as a farmer, with recurring attacks of pain and hæmaturia, the hæmaturia often being so profuse as to cause clot retention. He now appeared slightly anæmic and had lost some weight. On examination, a firm movable mass the size of a hen's egg could now be felt in the region of the lower pole of the left kidney. A left pyelogram now showed exactly the same type of defect as previously, but much more marked and, I think, conclusive of tumour (Fig. 3). He was given a course of deep x-ray therapy over the left kidney. Following this his condition decidedly improved, and he had no recurrence of bleeding for four months. He was now given a second course, and again the bleeding disappeared, this time for six months. He has, however, refused further treatment and is again bleeding profusely, has become anæmic and weak but is still doing some work. His doctor reports that there is still no great change in the size of his tumour.

It is most unfortunate that this man should have had a destroyed kidney, and surprising, though not unusual, that it had never given rise to any symptoms. The very profuse character of the bleeding, its rapid response to x-ray, and its slow progress make one suspicious that we are perhaps not dealing with the usual hypernephroma, but some less malignant, though highly vascular, tumour such as an hæmangioma. At any rate, the course of the disease has been such as to lead one to believe that nephrectomy four years ago might have effected a cure. An exploratory operation with a view to resecting the kidney or enucleating a possibly encapsulated tumour might even be justified in such a case.

CASE 5

A male, aged 35. This patient first came under observation in 1928. He had made application for life insurance, and on examination of the urine a large number of pus and red blood cells had been found. On checking back over the history nothing could be elicited, except that he had at times noted hæmaturia on exertion. A plain x-ray film was taken, which showed enormous staghorn calculi completely filling both kidneys. The blood urea measured 35 mg. per cent. There had been no appreciable change in his health over the intervening eight years. This man lives in a very moderate way, both as to diet and exercise. He is not employed steadily, but does some clerical work. He used to suffer from severe periodic headaches but of late has been entirely free from them. He feels perfectly well, and one can elicit no complaints, except that he cannot perform any work requiring physical exertion or even take a long walk without seeing blood in the urine afterward. Consequently he uses this as an index to his activities. A plain x-ray film taken in January, 1936 (Fig. 4), is identical with that taken eight years ago. The blood urea on the same date measured 32 mg. per cent.

These calculi are, I think, as large as anyone is likely to see and have to a remarkable degree destroyed his kidney tissue. It is surprising that he remains entirely free from symptoms, with no evidence of renal damage, though obviously such exists, and the blood urea in this case is not a reliable index of kidney function. I cannot offer any suggestion as to the etiology of these calculi since a complete examination has not been permitted.

One could go on to the hydronephroses and congenital anomalies, and present many more such cases. These, however, will illustrate the point and emphasize the necessity of investigating every case of hæmaturia.

REFERENCES

1. MILLER, J. AND YOUNG, D. H.: Essential hæmaturia in relation to pyelitis of the calyx-papilla angle, *Canad. M. Ass. J.*, 1931, **24**: 354.
2. SMITH, E. C.: Unusual case of unilateral renal bleeding, *Canad. M. Ass. J.*, 1931, **24**: 268.
3. BUGBEE, H. G.: Renal tuberculosis as local manifestation of general tuberculosis, *J. Urol.*, 1934, **32**: 1.

TECHNICAL FAULTS IN RADIODIAGNOSIS.—R. Ledoux-Lebard and J. Garcia-Calderon discuss wrong radiodiagnoses arising from faulty technique. Excessive darkening is one of the commonest of these errors, and may be due to many technical causes, such as the storage of films in too warm surroundings or their exposure to such destructive influences as coal gas or turpentine vapour. It is most often traceable to the accidental exposure of the film to light, or to the radiation from radium or x-rays, or to the action of chemical substances. Secondary radiations used to be a frequent cause of trouble, especially in the examination of corpulent patients, but modern refinements have very much reduced this complication. Chemical changes during development and fixing of the films, including the physical effects of temperature and oxidation, have always to be guarded against. The patient may introduce causes of error, and his cooperation is always necessary in obviating them. The radiographer is also culpable sometimes, and the authors detail the various precautions that must be taken, illustrating several diagnostic mistakes which resulted from their neglect. They insist that with the steady improvement in apparatus there has gone a certain lack of care in its employment, and that this conduces to difficulty in interpreting the faulty films which are thus produced.—*Paris Méd.*, Feb. 1, 1936, p. 99. Abs. in *Brit. M. J.*

TUBERCULOSIS OF THE BREAST*

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TUBERCULOSIS of the breast has been considered a rare disease. Recent studies have shown that it is frequently discovered in the course of examination for malignant and benign tumours of the breast. It is the purpose of this paper to present three cases which were referred to the Cancer Clinic of Jeanes Hospital, Philadelphia, and which demonstrate the pathological mode of invasion and infection in this disease.

Hospital statistics of the Mayo Clinic show that approximately 0.5 per cent of all mammary diseases are tuberculous, while the statistics of St. Bartholomew's give 1.5 per cent. Barker in 1926 reported a ratio of 1 tuberculous to 45 malignant breast cases in a total of 62 cases discovered in the Department of Pathology. Shipley and Spencer in 1926 were able to make a report of 205 cases. Morgan in 1931 presented a review of 439 cases in the literature. Almost all of these were proved microscopically by finding organisms in sections or pus or by typical tubercle formation, although these cases have all proved notoriously difficult to culture.

The disease was first reported by Sir Astley Cooper in 1822. The possibility of such a condition was rejected by Virchow, but Nélaton in 1839 and Bérard give reports of cases supporting Cooper's contention of primary tuberculosis separate from any other possible focus distant in the body. Heyfelder in 1851 reported the first case of tuberculosis of the breast in a male. The disease was first diagnosed with subsequent isolation of the organisms and reproduction of the infection by animal inoculation by Cuneo in 1868. Dubar in 1881 found the acid-fast organisms in the tissue and subsequently cultured them. Robinson in 1892 concluded that the disease did not come from a primary infection of the mammary glands themselves but located in the connective tissue, with the disease spread by lymphatic and hæmatogenous channels. The cases reported in this paper seem to corroborate Robinson's conclusions.

Differentiation between the primary and secondary forms is difficult. One should consider a lesion as primary if no other focus, active or latent, has been found. It can be safely stated that almost all people have been infected at some time in their lives without residual signs other than a positive tuberculin test; and that likewise the organism may be harboured in an inactive form for long periods.

To date there has been no report of an autopsy where tuberculosis has been confined to the breast with no evidence of infection elsewhere. This would indicate that there has been no truly proved case of primary tuberculosis of the breast. Shipley's contention that 60 per cent of all cases were primary was based on the statement by Gatewood, in 1916, who said also that there had been no reported case where complete study of the body had been made at autopsy in a case of this infection. Subsequent work has shown this conclusion to be definitely at fault. Heredity and trauma play little part as predisposing factors. As a rule, except in the thin, weak, anæmic patient where the breast tuberculosis is evidently a part of a generalized body infection, these cases are most frequently seen in well built, healthy persons. Few cases have a positive family history. The disease appears most frequently between the ages of 20 and 50. The youngest patient reported was six months of age and the oldest 73, although only 11 cases over 60 have been reported. Two of the cases reported here were over 60. Morgen found the sex incidence was 440/20, appearing preponderantly in the female. There is little difference with regard to the breast involved, 204 appearing in the right breast and 175 in the left in Morgen's series. Nineteen were bilateral cases. Child-bearing does not appear to be a gross factor, inasmuch as 201 out of 545 were in nulliparous patients.

It has been the belief of many that this type of infection is due to the bovine type of tubercle bacillus. Barker in 1926 stated that all cases in which the type of bacillus has been determined were proved to be of the bovine type, but the number of cases is too small to warrant conclusions, especially since those with apical tuberculosis are liable to be of human type. One's conclusion, however, is that tuberculosis of the breast may tend to disappear with the continued use of pasteurized milk. Shipley and Spencer, in discussing the channels of infection, corroborate Halstead, who felt that most cases exhibited retrograde infection from the axilla or from the intrathoracic structures and also added cases developing from primary infection of the cervical nodes or of tuberculosis of the lung and pleura. It is noteworthy that Gatewood found that 60 to 75 per cent of all cases had axillary

* From the Tumour Clinic of Jeanes Hospital, Fox Chase, Philadelphia.

glands involved, while Morgen found 236 out of a total of 439 in his report.

MODE OF INFECTION

The infection is transmitted to the breast tissue by various channels as outlined. (*a*) *Contiguity.*—Numerous cases have been reported of extensions from adjacent structures, such as the sternum and ribs. (*b*) *Surface contact.*—Fricke in 1907 reported a case in which a carcinomatous breast which had been massaged by a tuberculous husband was later found to show histologically both carcinoma and typical tuberculous infection. Ravenel has demonstrated the possibility of passage of the organism through the skin without residual evidence. (*c*) *Ductal.*—This possibility is remote, though there have been cases reported of contamination of the nipples by linens infected with sputum, and by manipulation of the breast and nipple. Morgen presented a case where the latter was the mode of infection.

(*d*) *Blood-borne.*—The majority of investigators have believed this to be the avenue of infection, though why the highly resistant breast should be picked out before other parts of the body is difficult to understand. This would also demand some other focus of origin. Therefore, such a tuberculosis of the breast would be patently secondary. Nagaskima, in 1925, in an examination of 34 autopsies on advanced cases of tuberculosis failed to find any tuberculosis of the breast. Raw likewise in a study of 10,000 cases of tuberculosis found only 7 cases of tuberculosis of the breast. Therefore the hæmatogenous route should be considered as truly rare. (*e*) *Lymphatic.*—It has been fully realized that tuberculosis displays a marked predilection for the regional lymph glands, from which it spreads by several routes: (1) through an efferent lymph vessel to an adjacent lymph node nearer the thoracic duct, and subsequently into the blood stream; (2) from a lymph gland via its efferent vein directly into the blood stream, or, if part of the portal system, it passes to the liver; (3) by direct extension to adjacent tissues as an abscess about lymph nodes; (4) by contiguity and extension through the walls of an adjacent vein from a lymph gland, and then into the blood stream; (5) where a lymph gland is invaded and destroyed by tuberculous involvement sufficient to render it incapable of transmission of lymph, its afferent vessels become in fact efferent, bringing about retrograde flow with transportation of abnormal material to other tissues and regional glands.

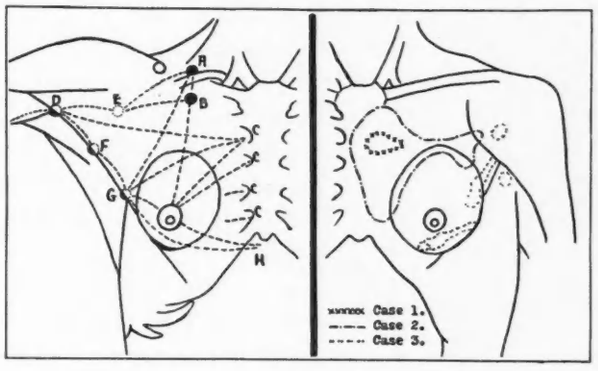

Fig. 1

LYMPHATICS OF THORACIC WALL (DIAGRAMMATIC)

A. Supraclavicular lymph glands.
B. Infraclavicular lymph glands.
C. From intrathoracic sources.
D. External axillary glands.
E. High axillary glands.
F. Mid-axillary glands.
G. Sub-pectoral glands.
H. "Dangerous triangle of Handley."

LESIONS IN REPORTED CASES

Case 1.—Arising from internal mammary, intercostal or intrathoracic sources C, extending by retrograde flow over pectoral muscles towards breast and axilla.

Case 2.—Extensive lesion arising as in Case 1, spreading by retrograde flow along CG towards and involving pectorals, breast and axilla (?).

Case 3.—Lesion arising probably in pectoral glands G, with lymphatic retrograde metastases to breast and axillary lymph glands.

Fig. 2. Case 3.—Roentgenogram of the breast shows no architectural alteration of malignancy. Note clouded shadows of inflammation in dependent portions.

It is this last-mentioned mode of spread that is the least realized, and yet it is one of the commonest and serves to explain much in both carcinoma and tuberculosis, where apparently bizarre extensions are encountered. Arising from almost any source in the body, regional lymph gland involvement will serve to involve the breast by retrograde metastasis. The glands thus involved are the axillary, subclavian, the internal mammary, intercostal, supraclavicular and even the inguinal. These are demonstrated in the cases studied in this report.

Halstead and LeCount found 75 per cent had tuberculosis of the lymphatics of the same side, and now many authors feel that breast tuberculosis is a retrograde lymphatic infection from axillary or intra-thoracic foci. This is supported by the observation that many cases are preceded by axillary nodes. Many proved to be positively infected on histological examination. Many other cases are quoted as having tuberculosis of the pleura or other nearby lymphatic structures. Deaver has quoted a case of a patient washing tuberculosis linens and developing an infected finger which healed in two weeks. Eight months later an axillary swelling appeared which was incised, but had failed to heal when seen three months later, at which time a lump was found in the breast. Some months later the chest exhibited signs of infection. A number of authors quote cases of tuberculosis superimposed on both benign and malignant masses.

PATHOLOGY

Tuberculosis of the breast is similar to this infection elsewhere in the body. The following forms occur:—

1. *Acute miliary mastitis,* which is very rare and of a secondary nature.

2. *Nodular tuberculous mastitis,* which is the most frequent type, and often is due to an individual tubercle in the breast. Its histology is that of a typical tubercle. This condition becomes disseminated, frequently resembles chronic cystic mastitis, and often is found in lactating breasts. It tends to break down and form sinuses. With advance of the disease there is a conglomerate involvement in which the breast is involved *en masse,* with hyaline degeneration and the typical tissue changes of advanced tuberculosis. A cold abscess is produced by a deep-seated confluent tuberculosis of the breast, which becomes walled off from the exterior and assumes a quiescent state. Its development is slow and may become encapsulated with hyalinization, or later form fistulous openings.

3. *Sclerosing tuberculosis of the breast.* This type develops slowly with the formation of much connective tissue and subsequent contracture. The breast is small, resembling a scirrhous carcinoma, and often may have numerous nodules attached to or in the skin. The nipple will usually be retracted. Histologically, there is a diffuse lymphocytic cellular infiltration, together with epithelioid and giant cells. There is little or no caseation and few sinuses. In the picture one may find new tubercles in the vicinity of older hyalinizing tubercles.

4. *Chronic obliterative tuberculous mastitis.* This is a rare and confusing condition in which the histological section will show destruction of the epithelial lining of the ducts, due to surrounding tuberculous lesions, and the subsequent filling of the duct lumina with tuberculous products leading to obliteration. The condition closely resembles certain obliterative types of mastitis in which there is a formation of foreign-body giant cells or pseudo-xanthoma.

SIGNS AND SYMPTOMS

Excluding those cases which are evident victims of a generalized infection, tuberculosis of the breast may be subdivided according to the rate of involvement and to the fibrous tissue response. The signs and symptoms vary widely, but the first and most important is a lump in the breast. About two-thirds of all reported cases give this as the first evidence of trouble. An enlarging axillary gland is often the first sign of the infection. Pain is much less frequent, usually appearing very late in the disease, and was reported in only 6 per cent of the early cases. An occasional early complaint is that of tender nipple. Retraction of the nipple is rare, and appears late and only in the scirrhotic type due to connective-tissue formation. The lump usually appears in the upper outer quadrant. It is often indolent, showing little tendency to advance, and the patient postpones visiting her physician until pain appears and the mass suddenly starts to enlarge. It usually develops steadily, sometimes rapidly, and *in no case has spontaneous regression been known.*

The disseminated nodular type grows very slowly and is painless. The breast is rarely

enlarged and is lumpy like a small adenomatous or chronic cystic mastitis breast. The condition then later becomes the confluent type in which the breast is distended, the skin tense and reddened, with much pain and later rupture with watery, cheesy pus. Multiple sinuses develop which spread to other parts of the body. Where there is no rupture the breast may be large, resembling a furuncle (cold abscess), with pus later forming in the skin nodules, or rupturing through the pores.

The sclerosing type exhibits a distorted breast with retracted nipple. The lesion, if palpable, is firm, often fixed, resembling scirrhous carcinoma, and frequently takes years to develop. This form is apparently due to a low virulence of the organism and a high resistance in the patient. It is most frequently seen in old women. The secondary axillary lesion, however, develops rapidly, going on to caseation. This swelling of the glands is one of the most frequent early signs of all types, often preceding the breast mass by a number of months.

DIFFERENTIAL DIAGNOSIS

Definite diagnosis of this condition is difficult at all times and must be differentiated from galactocele, chronic mastitis, and benign and malignant breast tumours. The non-malignant tumours have no axillary metastases, but the presence of enlarged and at times not tender axillary glands is not infrequent in galactocele, chronic mastitis, and cystic disease of the breast. Only the most careful physical examination and history can differentiate these forms. Sarcoma grows very rapidly and is comparatively rare. In this condition pain may be prominent, with dilated veins distributed over the breast. Adenofibroma is movable and grows slowly. Carcinoma is hard to rule out, even in the presence of fluctuation, as the case may be one of carcinomatous degeneration or tuberculous suppuration, but this usually appears late in the course of carcinoma when pain is present accompanied by nipple retraction. A lump of long duration without pain or nipple-retraction may be suspected as being tuberculous. Likewise, the presence of a fistula with a watery, caseous discharge, or multiple fistulæ without surface nodules promote suspicion of the tuberculous nature of the lesion. In fact, fistulæ were noted in 50 per cent of all cases reported. It is difficult to demonstrate the bacilli, as they were discovered in only 7 of 79 sections of cases presented by Deaver and in only 4 of the pus specimens. Nevertheless, it has been isolated in 25 per cent of all cases reported. The sedimentation test may prove of value in these cases to differentiate them from benign tumours. Transillumination and the x-rays are likewise distinct aids in diagnosis. However, none of the above differential points will always hold true. For this reason, a biopsy may be obtained from a portion of the lesion, sinus or ulcer. Where the mass is considered truly benign it may be excised widely and supplemented immediately with a frozen section. This should only be done where a more extensive and radical mastectomy may be performed immediately after, supposing malignancy were to be found.

PROGNOSIS

This condition is hopeless if untreated, usually following a rapid and fatal course. No case of spontaneous regression is known. The prognosis is excellent if the lesion or lesions are totally excised. Morgen reports the average expectancy of life in primary untreated cases to be 10.1 months, and 11.2 to 12 months in the secondary. Therefore, the disease has a more rapidly fatal course than even carcinoma.

TREATMENT

Treatment is always surgical, with immediate frozen section. This is, first, to establish the diagnosis and remove the patient's fear of cancer; secondly, because removal is essential as the disease, once started, never regresses, whether it is left alone or treated by any of a vast number of other suggested means. Early recognition and early operation will save many young people from disfiguring and mutilating operations. Furthermore, operation must not be postponed to await developments, as the course is usually rapid and fatal where untreated.

The types of treatment in these cases run the whole gamut, from useless and dilatory measures to rational and histologically correct procedures. (1) Curettage. (2) Cauterization. (3) Injection of sinuses and cavities. (4) Aspiration and incision of abscesses. (5) Excision of the tumour alone. (6) Dissection of axillary glands alone. (7) Partial mastectomy. (8) Complete mastec-

tomy. (9) Radical mastectomy. Nos. 1, 2, 3 and 4 are mentioned merely to state *what should not be done,* as they indicate not only a total lack of understanding of ordinary surgical procedures, but also a woeful absence of knowledge of the pathology and cell life and growth of both tuberculosis and of tumours. Nos. 5, 6 and 7 may be satisfactory if the lesion is definitely determined as benign, or if the diagnosis of tuberculosis of the breast is reasonably certain as determined by biopsy or culture of the pus from a sinus, or if the operation is supplemented by frozen section. However, the fact that Morgen found that 236 of the 439 reported cases had involved axillary nodes indicates that the above procedures may be inadequate. Thus, while in the given individual case one of these measures may ultimately prove satisfactory in the eradication of the disease, the average case might well be treated the same as, and as seriously as, any case of malignancy. If there is doubt present, a physician is called on to take all measures available, as he may be dealing with a disease either that is malignant or is of such a nature that it may prove just as fatal. Certainly, any small lump in the breast, not acutely formed or tender, calls for wide excision and frozen section. If there is any question of axillary enlargement, the rational procedure is radical mastectomy, which Hertzler in 1912 categorically opposed, or at least wide excision and axillary dissection. It will be agreed, however, especially in the absence of axillary enlargement, that the more conservative procedures of excision should be tried in the case of the young woman, deferring a more mutilating operation on an organ of such physical and psychic importance in young adult life. It was with just such a case that Berger and Mandelbaum report the use of tuberculin, topically applied, in combination with heliotherapy, with sufficiently gratifying response to warrant further trial, although the case reported ultimately terminated unsatisfactorily.

Summarized, excision of tuberculous breast lesions together with whatever obvious lymphatic extensions are present will be quite satisfactory. If a considerable part of the breast is involved mastectomy is advised. If there is any suggestion of axillary involvement these glands should be removed. Only healthy tissue should be left, careful hæmostasis effected, and well-nourished tissue should be brought in contact with well-nourished tissue, *obliterating all dead space.* Drains, if used, are removed the first day after operation. An immobilizing bandage, affording light pressure, is applied, and where possible, the wound is left alone for twelve to fourteen days following.

CASE 1

Tuberculosis of the sternum with extension towards but not invading the breast.*

A small sternal mass on a 49-year old labourer at operation showed the first stage in the retrograde extension of a tuberculous infection from a mediastinal source along regular lymphatic paths towards the breast; in this case halted before involvement of the breast had been effected.

An Italo-American labourer applied for treatment of a sternal tumour which had appeared two months previously, gradually increased in size, was not painful or tender, and had developed without apparent cause such as injury. He had had a productive morning cough for about twenty years, ascribed to his previous occupation of coal miner.

The tumour was located over the angle of Louis, 6 cm. in diameter, soft and fluctuant, extending slightly to the right in the second interspace. There was no apparent pulmonary involvement save a slight percussion dullness over the right posterior lower lobe. No cervical or axillary lymph glands were palpated. The Wassermann test was negative. The roentgenograms showed no destruction of the sternum, could not exclude anthracosis, but did lead to an interpretation of miliary tuberculosis. Aspirated fluid showed no organisms on smear or culture. Guinea-pig inoculation resulted in heavy tuberculous infection. The clinical diagnosis was tuberculosis of the sternum associated with pulmonary tuberculosis. The sternal mass was excised, at which time an extension in the form of a small sinus tract was found running for a distance of 3 cm. into the second interspace. Microscopically, zones of granulation tissue were present, including many epithelioid cells and numerous giant cells of the Langhan's type surrounded by marked fibrosis together with typical tubercle formation.

CASE 2

Tuberculosis of the sternum with involvement of the axilla and breast.

The patient was an elderly, married, white female, aged 71, very emaciated, and complaining of an enlarging mass on the sternum, present for one year and recently associated with pain. Her past medical history included an old Neisserian infection associated with rheumatism. She had had chronic bronchitis which was exaggerated in the morning, and for the last four years had been subject to severe asthmatic attacks. There was a questionable family history of tuberculosis.

The sternal mass extended from the jugular notch almost to the xipho-sternal juncture, and from the left border of the sternum over into the right pectoral area, with some characteristics of a cyst, though there was fixation to the underlying chest wall. Lateral to this mass was an indefinite induration and swelling of the pectoral region, and upper, outer breast. The axilla contained a number of hard, not fixed nor tender, lymph glands. The cervical and inguinal glands were not enlarged. A few fine râles were present in the right posterior apex of the lung. Roentgenological examination was negative for evidence of tuberculous involvement of the lung, while no apparent invasion of the sternum was found.

A clinical diagnosis of tuberculosis of the chest wall, breast and axilla was made. An attempt at excision of the mass followed by radical mastectomy was

* A full report of this case can be found in the reprint and can be obtained from the author.

found impossible, as the sternum formed a portion of the base of the cystic mass which continued out over the pectorals for about 8 cm. along the upper border of the breast to a point where it disappeared as a sinus opening into the pectoralis muscle. Subsequent to operation, the wound failed to heal, while the axilla rapidly increased in size. Secondary infection set in, with death one and a half months after operation.

At autopsy, an indefinite sinus tract was found extending from the sternum along the upper border of the breast and pectoralis towards, but not into, the axilla. The only other suggestion of tuberculosis was a few calcified nodules in the spleen and pancreas. Tissues of the breast failed to show typical tubercles, but giant cells were found together with a severe secondary infection. Positive guinea-pig inoculations, proved by microscopic sections as well as later subcultures on Petragagni's medium, verified the tuberculous nature of the infection.

CASE 3

Tuberculosis of the breast and axilla.

The patient was a healthy, very short and obese, almost senile, white widow, aged 68. She was admitted with discharging sinuses of the left axilla. No history of tuberculosis in her immediate or more distant related family was obtained. She gave a history of trauma of the breast and arm when those members were caught in the door of an elevated car eight years previously. Three years before admission a sore developed in the left axilla immediately upon the pectoral fold. One year ago this sore began to discharge, and, when seen by a physician, she was told to disregard the lesion as being of no importance. More recently more discharging openings had developed, and when seen by another physician she was told the condition was cancerous. Since then she has been awaiting the usual outcome of such a disease. There had been considerable recent loss of weight and strength but no pain was present in the involved area. She gave no history of past coughs, colds, sputum or hæmoptysis. She had had four pregnancies with no miscarriages.

On physical examination the right breast was found fairly full, pendulous, and rather soft in consistency. The right axilla appeared clear. The left breast was somewhat thinner, elevated about 3 cm. above the right breast, and pulled over towards the axilla, but there was no nipple retraction. Where the breast merged into the anterior pectoral fold there was an increase in tissue, with a distinct sense of an underlying mass extending fairly well underneath the lateral border of the pectoralis or into the axilla. A fairly high axillary and a posterior axillary group of glands was palpated. Four distinct sinus tracts with openings were present, one on the inferior aspect of the breast, covered by the overlying breast tissue, and the other three well out in the axilla. The diagnosis on admission was multiple tuberculous sinuses with tuberculosis of the upper, outer left breast, with carcinoma of the breast to be excluded. Cultures of the fluid removed from the sinus tracts were negative for acid-fast organisms. X-rays of the breast and chest were negative for malignancy, but showed that, while the patient had had an early type of pulmonary tuberculosis, there was nothing to suggest present activity. The Wassermann and Kahn tests were negative. A biopsy of the tissue from the sinus tract showed no tendency towards typical giant-cell formation or tuberculous infection, but was almost purely formed of cells resembling endothelial cells, less epithelioid than in tubercles, together with foreign body giant cells. Stains for tubercle bacilli were negative. No evidence of neoplasm.

With a pre-operative diagnosis of tuberculous sinuses around the left breast, a radical mastectomy with axillary dissection was performed.

Pathological report.—The left breast was hard and irregularly indurated in the lateral two-thirds, and contained two hard, cellular masses with central abscesses. A hard enlarged lymph node, with yellow degenerated tissue and pus, was found in the axillary tissue. Microscopically, the sections showed caseous degeneration surrounded by zones of varying width of epithelioid cells, and these in turn by wider zones of lymphocytic infiltration and a fair number of giant cells, mostly of Langhan's type. Typical small discrete tubercles were not found. Attempts to stain tubercle bacilli were without success, but occasional acid-fast, intracellular granules were seen, which may be related to Much's granules. Diagnosis.—Tuberculous mastitis.

SUMMARY

1. Tuberculosis of the breast is not a rare disease.

2. It occurs most frequently in women between the ages of 20 and 50.

3. While it is truly impossible to differentiate a primary from a secondary type, the disease does appear to spread by way of the lymphatics, originating in glandular structures of the axilla, neck, mediastinum or lungs. The three cases presented exhibit stages of an orderly retrograde tuberculous infection following definite lymphatic channels, tending to terminate in infection of the breast.

4. Cultures and positive histological sections showing tubercle bacilli are infrequent. No autopsy case of this disease has been found without evidence of other tuberculous involvement, active, quiescent, or healed.

5. Excepting the advanced general or miliary pulmonary cases, the bacillus involved in tuberculosis of the breast appears to be bovine in type.

6. Histologically the disease resembles tuberculosis of other parts of the body.

7. The presence of a lump in the breast, often preceded by an axillary lump, is usually the first sign. Pain develops late in the advanced stages of the disease.

8. The disease is a distinctly surgical one, with a good prognosis in reasonably early cases, demanding early treatment and ample removal, sometimes by radical mastectomy, as axillary involvement is frequent and the disease develops swiftly and never regresses.

NOTE.—Full references can be obtained on application to the author.

INSULIN, OLD AND NEW, IN THE TREATMENT OF DIABETES*

BY ELLIOTT P. JOSLIN, M.D.,

Boston

WITH great modesty I appear before the Ontario Medical Association in whose membership are those who gave insulin to the world. Nothing I might say relating to that great discovery could express adequately my gratitude to those Canadian investigators who produced it, or measure the joy I have experienced since insulin was placed in my hands on August 7, 1922. Facts speak louder than words, and here is my testimony to the value of insulin, based upon the lives of my patients and the computations generously conducted for me by the Metropolitan Life Insurance Company.

The expectation of life of my patients at ten, thirty and fifty years of age, regardless of the duration of their disease, as determined by their death rates subsequent to the first observation, has been computed for two periods, 1897 to 1914 and for 1926 to 1929. For children at 10 years in the earlier period the average expectancy was 1.5 years, but now it is 31.7 years. Whereas they did not live to reach their twelfth birthday, they now can be expected to attain their forty-first, even without any allowance for possible, nay probable, advances in treatment. Present these facts to the parents of a diabetic child, and can there be any hesitation on their part to use insulin? If there is, present the same to the Judge and Jury and let them decide what action should be taken.

The expectancies for the two similar periods at 30 years of age vary nearly as much; they are 4.2 years and 22.7 years, and for the age of 50 years also they show strong contrasts, 8.1 years and 13.2 years, respectively. But I have another line of evidence to offer you about the efficacy of insulin, namely, that obtained from my diabetic doctors. Doctors know more about diabetes than the laity, and doctors want to continue their practices. From what they have learned about diabetes by study and observation they are in a position to decide whether the treatment of diabetes pays. Therefore, it occurred to me that the records of my diabetic doctors ought to show the results of a knowledge of the disease. In

* An Address delivered at the Fifty-sixth Annual Meeting of the Ontario Medical Association, London, Ont., on May 28, 1936.

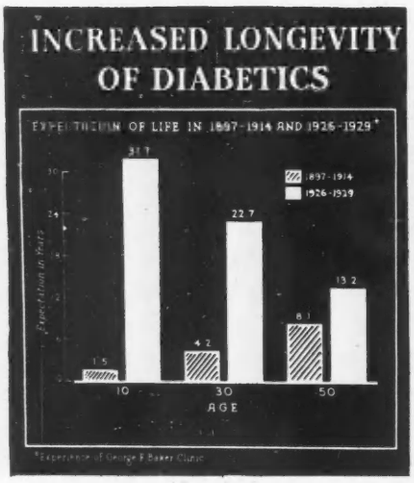

Chart 1

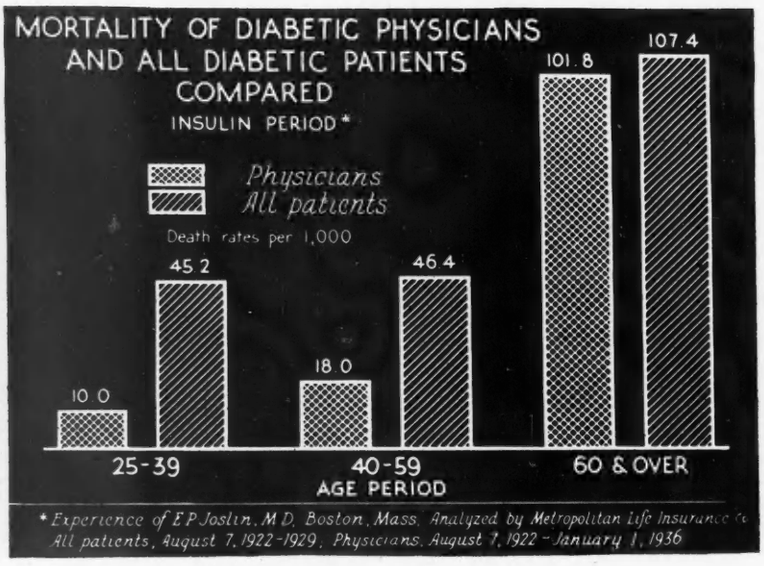

Chart 2

Chart 1.—The expectation of life of the diabetic child and young adult has increased many fold, and even for the fifty year old diabetic, has risen over 50 per cent. The increased longevity of diabetics is due largely to insulin which has reduced diabetic coma, and minimized the risk of infections and surgical complications. Modern treatment adds years to the productive life of diabetics. *(Prepared by the Metropolitan Life Insurance Company.)*

other words, is it worth while to teach a diabetic a good deal about his ailment?

Three hundred diabetic doctors have consulted me since 1898, and of this number 92 have died. Again, through the courtesy and cooperation of the Metropolitan Life Insurance Company, a statistical analysis has been made of this group. (The case numbers and not the names of the doctors have been submitted for study.) This demonstrated, first of all, that since 1922, the date of the introduction of insulin, diabetic coma has practically disappeared as a cause of death among doctors. It has amounted to but 3 per cent. This is all the more notable because diabetic coma when it develops in adult life is a serious complication, and recoveries are far less frequent than in childhood. Under efficient treatment nearly all cases of coma in children can recover. We have lost one case in 87 children 15 years of age or under, and, indeed, this is the only one among the 134 whose diabetic onset was under 15 years, or 0.7 per cent since 1933, but in adults the fatal outcome has risen to between 25 and 40 per cent for some of the decades. Doctors realize the danger of coma. Doctors know how to avoid diabetic coma, and consequently do not expose themselves to it. Doctors are unwilling to die of diabetic coma. If doctors will not die of diabetic coma, why should their patients?

Another comparison can be made between my diabetic doctors and my other diabetic patients of similar age groups. Whereas between 25 and 39 years of age the death rate per 1,000 for diabetic doctors is 10, among all my diabetic patients it is 45; at 40 to 59 years the rates are 18 and 46.4, and at 60 and over, 101.8 and 107.4 respectively. Finally, I will add that the average age at death of all my patients is 63 years but of my doctors is 68 years, and I am trying hard to raise the average to the Psalmist's three score years and ten. Diabetic doctors know how to profit by treatment and so keep alive. For years I have realized that many diabetics, because of their wisdom, were able to live longer with their disease following its onset than their non-diabetic friends of equal age. Indeed, approximately 400 of my patients have been given medals for this achievement. Today the percentage of my patients living over 20 years is ten times what it was prior to 1914.

All that I have said thus far supports my life's endeavour, namely, to prove that knowledge of his disease protects the diabetic. It further serves to drive home the idea that the discovery of insulin has revolutionized the treatment of diabetes.

The education of the diabetic.—The education of diabetics can be accomplished by books, moving pictures, class teaching, and individual instruction, but perhaps most of all they can profit from contact with other patients. The personal element and the spoken word are the most important, because what one type of diabetic needs would be superfluous for another. The disease is an interesting one anyway, and it is easy to impart information and this falls on willing ears.

At the George F. Baker Clinic we furnish the patients with printed material relating to diet and hygiene, encourage them to secure a manual on diabetes for a guide at home, and approve their following the outcome of their daily tests. There is a daily class room exercise at 10.30 a.m. with a doctor as a teacher. It lasts forty-five minutes, and we endeavour to make it systematic and to cover the subject of diabetes in one week. Fundamentals are emphasized. The class often becomes a clinic and sometimes an experience meeting. In addition, the Teaching Diabetic Nurse gives on Sunday a classroom exercise for the benefit of those who are only in the hospital for a week-end or brief stay.

Classroom instruction is supplemented by individual instruction, either in the office or by the Teaching Diabetic Nurse at the bedside. Appointments are made, and there is an endeavour to talk with the patient in the presence of his family. Indeed, my colleague, Dr. Root, has found it most helpful one night a week to meet the relatives of our surgical patients who have lesions of the lower extremities and to instruct them in the care of those who are soon to be discharged.

The Wandering Diabetic Nurse is another agency for instruction. Originally, she spent nearly all of her time in the homes of the children, but this last year she has visited and helped at the other end of life in the supervision of the very old children in their own homes. In the summer she has charge of the Clara Barton Homestead Camp for Diabetic Girls at North Oxford, Massachusetts, at which we have a group of 100 children in the course of two months. This summer in all we hope to have 175 children in various camps.

Diabetics today are living a long, long time.—Do you physicians realize that the chances are that the diabetic child of 10 years of age who enters your office will still be living when you give up practice? Doctors work only about 30 years, and the diabetic child will live as long. In fact, I am convinced that the average diabetic who develops diabetes in 1936 will certainly live 20 years! This being so, how are you and I to hold our diabetic patients, not for their but for our lives? And the answer is—only by the application of knowledge to the disease. At each visit one must be able to tell his patients something more than they have read in the newspapers and weekly publications, something which they will recognize as directly helpful. That is why I have travelled more than 5,000 miles these last few weeks; it is one of the reasons I came here today—to learn something so that I can go home and treat my patients better. And now may I pass on to you a few practical observations and suggestions about the treatment of diabetes, gathered here and there and from experience.

Laboratories and laboratory tests.—A doctor and his wife brought me this month their little girl, not quite four years of age. She had shown a little glycosuria, and according to their story they took her to a hospital — they said a children's hospital — for diagnosis. She was given a sugar tolerance test. The house officer missed the veins so many times that when he came to perform the last tests the tears ran down his cheeks. Incidentally, when the blood of the doctor's wife was taken she told me she fainted. Moral.—Always assure yourself that capillary blood sugars shall be taken from a child, and, if you follow my rule, you will never allow the blood of a patient to be taken from a vein except when lying down. Incidentally, remember that capillary blood is the equivalent of arterial blood, that in the fasting state capillary and venous bloods are identical, but after food the capillary may be 30 milligrams more than the venous.

Laboratories are splendid; without them diabetics cannot get adequate treatment. They should be within the reach of every family doctor, just as they are available for every hospital doctor. From them for poor patients he should be able to secure tests for sugar in blood or urine free, at cost for indigent patients, and at reasonable rates for paying patients. This becomes possible when we remember that wholesale tests are cheap, single tests expensive. Increase the output of the hospital laboratory; reduce the expense of individual tests. (Later in the day I visited your government laboratory and found you have the service I would like to see inaugurated in Massachusetts.)

Laboratories, like obstetricians, must function day and night. Diabetics and babies are alike; they need instant care. Babies sometimes will be born between Saturday noon and 9.00 a.m. Monday, and likewise coma cases may develop at such inconvenient hours. Further, laboratories must function promptly. Tests for CO_2 combining power of the blood plasma in diabetic coma do not aid in the care of the patient if reported twelve hours after death.

Doctors need for their diabetic patients "diabetic islands of safety". Such I believe to be the hospitals with well equipped laboratories, capable of work day and night and holidays. Such hospitals also should have a Teaching Diabetic Nurse to instruct the other nurses in diabetic nursing and also the diabetic patients as well. If called upon to help doctors in the vicinity in the instruction of their patients she should be available. Our Wandering Diabetic Nurse is of great service in this way.

Heredity and obesity.—At Sioux Falls, S.D., a few weeks ago Dr. Gage collected 23 diabetic patients, and I had the pleasure of having them on the platform for a clinic before the South Dakota Medical Society. On the front row I placed four brothers and sisters, all diabetics; the fifth child in the family already had died of the disease. Never forget that diabetes is hereditary. Seek for the source of your case and train the patient to be on the watch for the other diabetic members in his or her family. The early diagnosed diabetic, like the early detected case of tuberculosis, is the one who does the best. And since obesity is the most common cause of diabetes in the hereditarily predisposed, teach your patient to protect his relatives by urging them not to get fat. The diagnosis of diabetes places upon the diabetic individual the protection of his family.

Protamine insulin. — In the *New England Journal of Medicine* for today, May 28, 1936, will be published the second report upon protamine insulin from the George F. Baker Clinic. I cannot help making a few excerpts from it (with the consent of its Editor), but in addition

there are certain new features regarding its use which I wish to call to your attention. Three cases merit repetition.

CASE 1

"Eleven year old Blair W. showed 10 per cent of urinary sugar upon the morning following the discovery of his diabetes, and began the use of protamine insulin forthwith. Thirty units were given before breakfast on the first day, 50 units on the second, third and fourth, and upon the fifth day the urine was sugar-free although the patient had received in the previous 24 hours 210 grams of carbohydrate and 1,900 calories. He had no reactions and eleven days later, while at home, was sugar-free with a normal blood sugar. By that time his insulin had been reduced to 24 units before breakfast. It is true he was a fresh case and a child, but contrast this experience with the inauguration of treatment with former methods." (October, 1936, alive, sugar-free, protamine insulin 16 units.)

CASE 2

"Mrs. S., a nurse 36 years old, so crippled with rheumatoid arthritis that exercise was impossible in the treatment of her diabetes of one year's duration, weighed 84 pounds in July, 1935. To control her diabetes she required insulin in enormous amounts, given in 4 to 6 doses daily for six months. At one time she took as high as 530 units a day. Since January she has shown improvement, her weight has risen to 117¼ pounds and the insulin was decreased to 240 units administered before meals and on retiring. Upon January 23rd she began protamine insulin, and now in April her diabetes is equally well controlled with insulin once daily, 120 units of the old and 120 units of the new."

CASE 3

"Ruthie's parents told me that since her severe reaction ten years ago they had not dared to let her sleep alone. This last autumn, the week after entrance to a college in Boston, while at lunch with her mother at a restaurant, she had so violent a reaction it was necessary to call an ambulance and remove her to a hospital. Immediately she began protamine insulin and is now taking 40-0-[36]. Her mother says, 'Since Ruthie commenced protamine insulin she has had no reactions. She sleeps alone. You cannot tell, Dr. Joslin, what protamine insulin means to her father and me'."

More than 100 of my patients have been given protamine insulin and the greater part of them continue to use it. No patient taking it has developed coma, acidosis, or any complication common to diabetics, such as lesions of the feet or skin. The number of doses has been reduced from six to one or two daily. In only one instance has there been local irritation from the protamine insulin, and that patient has not been under my continuous observation. Reactions have occurred and at times with little or no warning. They occasionally have reached the convulsive stage, but nearly always this has happened when old insulin and new insulin have been employed in the same twenty-four hours. The reactions may last for a considerable period and require repeated administration of carbohydrate for their relief. One of the patients developed a cerebral complication, but I am not convinced that it had anything to do either with the reactions he had had in years gone by with old insulin or his recent reactions with new insulin. Protamine insulin I consider a real advance in the treatment of diabetes, but I do not believe that we know the best methods of employing it, nor do I think that it should be distributed yet for general use. The old insulin we understand and we all know that it always works. We must not undermine confidence in insulin by giving to practitioners a preparation, although it may be better in some respects, whose action is not thoroughly understood. The technique of the manufacture of the protamine insulin is improving and I can say definitely that our results with the newer preparations are more uniform. I suspect that it will not be long before it is still more reliable.

Our administration of the protamine insulin can be improved. It is not a matter of indifference to inject 20 units of old insulin twice a day and then change over to the injection of 40 or 50 units of protamine insulin in a single dose. More pains must be taken with the actual technique of injection, and one must also select more carefully the sites for the injection. An injection into the firm tissues of the arm may work quite differently from an injection the next day into the looser tissues of the thigh, and I imagine the variation might be still greater if the drug were introduced into the very loose subcutaneous tissue of the abdomen.

The strength of the preparation may be important. The single doses of the protamine insulin are larger, and, therefore, U-40 insulin is too bulky, but just how U-80 protamine insulin will act I do not know. Perhaps we should never inject more than 1 c.c. of insulin in any one locality.

Shall we inject the protamine insulin subcutaneously or intramuscularly? This is another question open for investigation. The muscles act with the help of insulin. Evidently we must study the new insulin under conditions of rest and activity. If the patient is exercising violently, will he be capable of drawing upon his deposit of protamine insulin just as it is required, or will it be released too slowly or too rapidly? Here are fascinating problems, but not all of them are appropriate for the general practitioner to solve.

In any estimation of the value of protamine insulin one is forced at the moment to depend upon immediate results, such as prolongation of the action of insulin and freedom from reactions, but, beneficial as these are, we consider them to be insignificant in comparison to the better control of the diabetes which it makes practical. Formerly a diabetic could maintain a reasonably normal blood sugar for one-half, two-thirds, or three-quarters of the twenty-four hours, but consider what this signified if applied to the course of his diabetes throughout twenty years — the average duration of diabetes with onset in 1936. It would mean that for one-half to one-quarter of this period, namely, 10 to 5 years, he would be living with an abnormal blood sugar with all its implications. And it is this long-range view of the diabetic situation which is ultimately the more important.

"The Hagedorn Era".—Whereas the three Banting Eras, early, middle and later, made increasingly possible the conquest of coma, the Hagedorn Era makes possible the approximation of the physiological processes of the diabetic so nearly to normal that arteriosclerosis should cease to be his distinctive enemy. Protamine insulin has broken the spell of content which the original insulin induced. Now we know improvements in insulin are possible. These are the chief reasons that for ourselves we think it only fair and a just due to the Copenhagen investigator to name this present era the "Hagedorn Era".

The administration of protamine insulin is more complicated than regular insulin and various precautions are necessary for its successful use. Deliberately, however, we have taught our patients to employ it, and have had them carry out the mixture of the insulin with the protamine in their own homes, because if protamine insulin is to be used widely, patients must be able to make these mixtures themselves. It is true occasionally they have made gross and amusing errors, but it is a fact that in no instance have we felt compelled to change over our plans and arrange for the mixture of the protamine with the insulin in the hospital or office. Patients have been taught to keep the protamine insulin in the ice chest, to use only dry, cold, and sterilized syringes and needles, and when both old and new insulin are to be injected to make separate injections. In a few patients we attempted to employ a needle three-quarters of an inch long and two dry syringes, injecting the old insulin first, then slightly withdrawing the needle and with a new syringe injecting the protamine insulin. This did not seem a practical method for most patients to carry out without obtaining an undesirable mixture of the two types of insulin in the tissues.

Dosage.—The number of units of protamine insulin required for a diabetic whose diabetes is controlled is not materially different from the number of units of regular insulin, no matter whether the protamine insulin is given in one or two doses. Protamine insulin acts so slowly that its full effects may not become manifest for five or six days, and herein danger lies, because the dose may have been increased so markedly as a result of heavy glycosuria that at the end of that period unnecessarily large amounts are being employed. Especially is one apt to obtain reactions at this time if old insulin and protamine insulin are combined before breakfast. It is so unusual for us doctors to expect our patients to have normal blood sugars early in the morning that a reaction may be precipitated if the patient receives quickly acting old insulin a half hour or more before his morning meal. Therefore, we have recently made it a rule that no patient taking old and new insulin should have it injected more than 30 minutes before taking food.

In changing from old to new insulin it is probable that in the controlled case approximately the same number of units will be employed. For the first few days following the shift the glycosuria will increase, but eventually it will disappear and in a considerable number of patients the reports come back that the patient needs less rather than more total units than before the protamine insulin was started. By no means can this statement be made unequivocally.

Diets.—Protamine insulin works successfully even if the carbohydrate in the diet varies from 100 to 275 grams.

The indications for the use of protamine insulin.—1. A trial should be made with diabetics of recent onset, because it is probable that such patients can be controlled with a single daily dose of protamine insulin from the beginning of treatment. Indeed it is our impression that we will never learn what protamine insulin can do until we use it as a remedy *sui generis* and observe patients treated with it exclusively over a period of years.

2. High fasting blood sugar values are a definite indication, because of the great advantage to a diabetic in beginning his day with the nearly normal metabolism indicated by a normal blood sugar.

3. Multiplicity of dosage can be avoided by the use of protamine insulin, and the consequent gain in simplicity and convenience of treatment improves the end-results.

4. Sensitivity to insulin, as indicated by the frequency of reactions, constitutes the fourth major indication.

5. Hepatomegaly is an indication, because of the reported efficacy of protamine insulin in reducing the size of the liver (Hansen).

6. Lipodystrophy may be favourably affected by the reduced number of injections and lessened acidity of the preparation.

7. Finally, it may prove to be of especial value in mild diabetics, in patients with hyperlipæmia, cardiac cases in whom hypoglycæmia should be avoided and, for the same reason, where there are occupational hazards.

CONCLUSION

With protamine insulin the fundamentals of treatment of diabetes are not changed, but the ideals of treatment are more nearly achieved. Diabetes today is a disease to be respected, and neglect to do so spells disaster. Diet and exercise are as essential as ever. The patient must not overeat, but it seems likely that having determined the insulin dosage for a given quantity of carbohydrate the protein can be determined by adjustment to the age and size of the patient, and fat regulated by body weight, and even the carbohydrate can vary 10 to 20 per cent up or down with comparative impunity.

The simplicity of the administration of insulin in one or two doses instead of two, three, or four doses will appeal so generally to patients that the probability is strong that the number of diabetics taking insulin will increase. As a result the percentage of deaths from coma should fall at an accelerated pace.

Best of all is the hint that the more complete control of the disease which the new insulin makes possible may so raise the standard of bodily health that the diabetic will be less subject to, and will resist more successfully, the various so-called diabetic complications, infections, vascular degeneration, and abnormal neurological and ophthalmological manifestations.

PRESENT-DAY METHODS OF TREATMENT OF CARCINOMA OF THE BREAST: INDICATIONS FOR THE USE OF EACH METHOD*

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THE treatment of carcinoma of the breast remains a difficult problem. The results obtainable through the use of surgery or radiotherapy are only too frequently disappointing. An expression of opinion as to the place that each of these forms of therapy should occupy may be of some value. It is not possible or wise to form unalterable conclusions at the present time, since the technique of radium and x-ray therapy is constantly changing. Following a recent visit to Europe, a considerable survey of literature on the subject, and with the knowledge gained from the privilege of seeing all cases of cancer of the breast that have come to the Toronto Branch of the Ontario Institute of Radiotherapy, I have attempted to formulate my views on the subject.

Cancer of the breast is always at one stage in its development a local disease, capable of being cured therefore by either complete removal or complete destruction of the local area. At a time, impossible to determine in any given case, the malignant cells wander away into the surrounding tissue spaces and subsequently into the lymph vessels in which they are carried to the nearest group of lymph nodes. The anatomy of the spread by way of the lymph vessels and lymph nodes is well understood, but one is perhaps less apt to remember the extent to which the cells may wander in the surrounding apparently healthy tissues. Dudgeon and Barrett[7] examined by means of the wet-film method the muscle, the skin and outlying parts of the gland in 37

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cancers of the breast removed by radical amputation. They found cancer cells in apparently normal tissues, often far removed from the local growth, in 26. That is, it is impossible to be certain that the local disease has been completely eradicated by surgical removal.

Every lump in a breast should be suspected of being malignant until definitely proved to be innocent. This, with few exceptions, means that the lump should be removed and submitted to histological examination. Even definitely cystic swellings must be suspected, since one has accidentally found a duct carcinoma upon more than one occasion when such a cyst was opened.

The earlier the patients present themselves for advice, the more difficult it becomes to be even reasonably certain of the diagnosis. It is probably impossible for even the most expert to diagnose accurately small breast tumours in more than 50 per cent of cases by clinical methods alone. Under such circumstances it is necessary to choose between local incision, local excision, and local amputation of the breast. For some time there was a tendency to advise against a local approach to the tumour because of the feeling that the disease was likely to be disseminated in this way. There is now plenty of evidence that anything but the most gentle handling of the lump in an attempt to arrive at a diagnosis is as likely to express cancer cells into the lymph channels as any carefully conducted exploration. In the presence of a single localized lump the method of choice would seem to be a local incision of the mass followed, if the diagnosis is still uncertain, by local excision. Local incision may result occasionally in the removal of a benign portion beside a malignant nodule, but, providing a negative report from the pathologist is followed by the removal of the entire lump for examination the chance of a final error in diagnosis is exceedingly small. In many instances where local excision seems simple, and especially where the weight of evidence is in favour of benignancy, this will be the obvious primary procedure. Such local operations should be done, of course, wherever possible, with full preparation for an immediate radical amputation should the growth be found to be malignant. The gross appearance of the cut surface is sufficient for diagnosis in the majority of cases, but this is inconclusive sufficiently frequently that the services of a skilled pathologist should be available always. When such pathological service is not available, local excision of the mass, followed in a few days by a radical amputation should the specimen prove malignant, may be justifiable. It is possible that it does not greatly reduce the patient's chance of recovery, but it is not the ideal procedure.

If the lesion is diffuse a local exploration is not advisable, since it is necessary that the pathologist be able to examine the whole breast, to exclude the possibility of a small malignant area. The same is true if the breast is being operated on because of bleeding from the nipple in the absence of any palpable tumour.

When x-ray or radium treatment of a breast tumour has been decided upon it has been the custom at the radium institute to confirm the diagnosis by an aspiration biopsy. A negative report is regarded as valueless and is followed by the removal of a piece of tissue in the ordinary way. The aspiration method has proved fairly satisfactory in such cases and less objectionable, so far as radiotherapy is concerned, than other methods. It is not recommended when surgical treatment is contemplated.

It is exceedingly important that women should be able to feel, when they report with a lump in the breast, that the most conservative measure consistent with reasonable safety will be carried out, and that they will not lose the breast unless this is absolutely necessary. Many women conceal breast tumours because they fear that if they go to a surgeon an amputation will be advised. Only when it is realized that no unnecessarily radical measure will be undertaken is it likely to be possible to persuade them to disclose the presence of small, painless lumps. For this reason, even if local exploration carries a slightly greater danger than local amputation, and such has not been demonstrated, one should still feel that it is the method of choice in suitable cases.

In the treatment of cancer there are still only three agents of proved value, surgery, electrocoagulation, and radium or x-ray. Except in so far as the diathermy or endothermy needle may replace the scalpel in local excisions or local explorations, electrocoagulation is not applicable to primary cancer of the breast. It is necessary, therefore, to decide whether a patient should be treated by surgery alone, by x-ray or radium alone, or by a combination of both. It is not reasonable to suppose that radium or x-ray could give better results than surgery in those cases in which the disease is confined to the breast or to the breast and accessible surrounding tissues

and lymph nodes. That results quite comparable with those usually obtained by surgery may follow the use of radium alone, at any rate by certain workers, has been shown, particularly by Keynes.[16-20] Were it possible by this means to retain a normal or nearly normal breast, one might be inclined to regard it as the method of choice. It is now thought advisable by these workers to excise the main mass, or the main mass and a portion of surrounding breast tissue, or to do a local amputation, and follow this in ten days to two weeks by implantation of radium needles. Such a routine subjects the patient to two anæsthetics and perhaps a third for removal of the needles, is undoubtedly accompanied by more discomfort than surgical removal, and leaves the patient with a final cosmetic result no better than that which follows amputation. A second treatment is sometimes necessary. The functional result is apt to be inferior to that which follows expert surgery. The loss of time and the expense are both considerably greater. Many radium therapeutists feel that it is impossible to be certain that the needles have been so placed as to administer an accurate dosage. One is not convinced, therefore, that most reasonably early cases should be treated by interstitial radiation. The method has been proved, however, to be of value in selected cases.

Mass surface radiation, in the form of radium bomb, teleradium, has not been used in most radium centres for long enough or on a sufficient number of patients for any final opinion to be expressed; its effect upon some has been impressive. Again it is not possible to believe that it could give better results than surgery in the early cases. If it should give comparable results to surgery the cosmetic result is likely to be better than that obtainable either by surgery or interstitial radiation. In those rapidly growing tumours in young women, and particularly those occurring during lactation, it may prove to be the method of choice, since here the results of surgery are notoriously poor. Again, the treatment is time-consuming, and because of the large amount of radium required must be expensive.

In the roentgen-ray treatment of carcinoma the most recent trend is toward the use of much smaller doses than were employed a few years ago over a relatively long period of time, *i.e.*, some modification of the Coutard method. The treatment as employed by Coutard is too time-consuming to be practical in a centre where large numbers of cancers must be treated. It may require as long as two months to complete the treatment of a carcinoma of the breast. For cases which are operable it should not be considered.

From the foregoing discussion it would seem that operable cases of carcinoma of the breast should be operated upon. It is difficult to believe that it makes much difference whether the operation is done with a scalpel or with an endothermy or diathermy needle. If a current is used which really coagulates the vessels as they are cut, thereby sealing them and possibly preventing the spread of cancer cells, healing of the wound is pretty certain to be interfered with quite frequently. If a definite cutting current is used, so that bleeding is almost as free as with a knife, there can be little advantage. Electrocoagulation may be the method of choice occasionally, for the destruction of local recurrent nodules on the chest wall which have proved resistant to radium.

One may now consider the value of pre- and post-operative therapy. It is impossible to obtain any satisfactory statistical information as to the value of the former. At the Radiumhemmet in Stockholm it has been employed as routinely as possible for the past three years. It is too early to form a definite opinion as to the results, but Professor Berven[3] thinks that they are being improved by pre-operative therapy. Although post-operative radiation has been employed extensively for some years, one feels uncertain from a survey of the literature that the percentage of cures has been increased to an appreciable extent; certainly there is not general agreement that this is true. It is a matter upon which a proper judgment is extremely difficult, as comparable groups of cases must be followed over many years to justify conclusions.

Pre-operative therapy has not been employed routinely at this centre. The value of x-ray therapy followed in a few days by amputation would seem to be doubtful. Most workers advise an interval of four to six weeks between the last treatment and operation. This routine is difficult to carry out, particularly in those patients who come from a distance. Even in Sweden, where the organization and relatively short distances make it much easier for them to employ it as a routine, they have found it difficult in cases coming from the more distant centres. The method has been employed here frequently in advanced cases. When one sees the manner in

which the majority of tumours decrease in size following the treatment it seems that it should be a useful routine, even in early cases. If the main tumour is affected so markedly surely the local spreads of individual cells or groups of cells ought to be still more affected. In the present state of our organization it is not practical to employ pre-operative x-ray therapy as a routine, but in those cases on the borderline of operability it should be employed, probably, wherever possible. A difficulty which must not be lost sight of is that following a marked shrinkage or even a disappearance of the tumour it may not be easy to persuade the patient to submit to an operation. This should be discussed before treatment is begun. In the majority of instances in which surgical excision has been done in this clinic following mass radiation, cancer tissue was still present, even though marked shrinkage had occurred. It is, however, only fair to state that several cases that have responded most favourably have not been operated upon but are being kept under observation. It is possible that in some of these the tumour cells may have disappeared. If such nests of cells are not removed recrudescence of the disease is certain sooner or later. It is important, therefore, that the patient should understand beforehand that shrinkage or even apparent disappearance of the tumour does not necessarily mean cure. Providing a period of four to six weeks is allowed between the last treatment and operation there should be no interference with wound healing.

The value of post-operative therapy would seem to be fairly well established, although, as stated above, it is difficult to find very convincing statistical proof. In coming to a conclusion as to its value one must not consider the percentage of five to ten year cures only but the influence upon local recurrences. At the Institute of Radiotherapy cases are seen from many centres as well as those operated upon locally. The majority of the local cases have received post-operative therapy. In these, skin recurrences are uncommon, whereas in those that received no post-operative treatment such local recurrences are frequent; in fact the majority of these patients come to the clinic for the treatment of such lesions. It is one's impression that this is almost equally true of glandular recurrences. In recent years the amount of skin removed has been definitely less, the aim being to obtain a primary closure in nearly all cases and to depend upon x-ray to control skin metastases. In spite of this skin recurrences are quite uncommon. If post-operative therapy does nothing more it would still be well worth while. Through this it undoubtedly increases the comfort of many patients while they live, even though they still die in the same length of time from more distant metastases. Through control of such local lesions, which would eventually become generalized, it must prolong life. In those patients in whom the disease has spread beyond the accessible areas it is not reasonable to expect cure or even much prolongation of life from pre- or post-operative treatment.

Definite skin recurrences would seem to be controlled more effectively by radium than x-ray. Recurrences in the lymph glands in the axilla, infra-clavicular or supra-clavicular fossæ, may be treated by radium pack or teleradium. Surgical excision of involved cervical nodes is rarely necessary; only the occasional massive recurrence in the axillary glands demands surgical removal following radiation. The detail of such treatment is a radiological problem and therefore beyond the scope of this paper.

One has to consider finally those patients who report for treatment at an advanced stage in the disease. Large local growths operable only if a very extensive removal of skin is carried out followed by grafting may be made operable by x-ray or radium therapy. Such patients cannot be cured by any method at present known, but they may be rid of a local mass which is about to ulcerate or which has already ulcerated, and life be made more tolerable while it lasts. Cases with local masses which are not likely to ulcerate and with extensive axillary and supra-clavicular glandular metastases should be left to the radiologist, except where local excision of the main mass may be considered advisable following radiation in order to reduce the amount of cancer tissue to be destroyed. No operation is justifiable if metastases in the lungs and bones are already demonstrable, except where local excision is indicated to remove a mass which has ulcerated or is about to ulcerate. All patients presenting symptoms suggestive of pulmonary or skeletal metastases, and all advanced cases, whether or not such symptoms are present, should have x-rays made of the lungs, lumbar spine and pelvis before being submitted to operation.

Bone metastases may be held in check frequently by deep therapy, and when the lesions are painful the relief obtained may be most gratifying. A definite recalcification sometimes

follows treatment, and postpones or even prevents a pathological fracture. The treatment is always worth a trial, if only for the relief of pain.

In conclusion, one would reiterate that the value of x-ray and radium therapy in breast cancer cannot be judged by the consideration of mortality statistics alone. One must be content in surgery with rendering life more tolerable for many patients with cancer or, when possible, with lengthening life a little and at the same time rendering it more comfortable. The same reasoning must be employed when one attempts to assess the value of x-ray and radium.

When the results of surgery are judged it is the work of expert surgeons that is taken into account, so when what is accomplished by radiotherapy is estimated only the work of a competent radiologist who has at his disposal an adequate amount of radium and the most modern equipment for x-ray therapy should be considered. This ideal is approached only in a few specially equipped centres, and doctors should recognize that if radiotherapy is to be employed patients should be referred to such institutions. Inadequate and inexpert treatment is certain to be disappointing and may, of course, be very harmful.

SUMMARY

1. Every lump in the breast should be regarded as possibly malignant until definitely proved to be benign.

2. Local exploration of breast tumours is a safe procedure, provided that a diagnosis of cancer be followed by an immediate radical amputation.

3. Diffuse lesions and those associated with bleeding from the nipple in the absence of a palpable tumour call for local amputation of the breast.

4. Patients with carcinoma of the breast in which the disease is apparently confined to the breast or the breast and accessible lymph nodes should be operated on.

5. Pre-operative radiation would probably be a good routine in all cases, but is not practicable at the present time. It should be done in all advanced cases.

6. Post-operative radiation is advisable in all cases, despite the stage of the disease.

7. Radium and x-ray therapy are valuable in the control of local recurrences, though by no means always successful.

8. The treatment of cancer of the breast is a combined surgical and radiological problem.

BIBLIOGRAPHY

1. ADAIR, F. E.: Highly malignant carcinoma of the breast with bulky metastases treated by irradiation alone, *Ann. Surg.*, 1934, **100**: 373.
2. ALLISON, R. G.: Radiation treatment of carcinoma of the breast, *Minnesota Med.*, 1934, **17**: 435.
3. BERVEN, E., Radiumhemmet, Stockholm, personal communication.
4. CADE, S., London, personal communication.
5. CARTER, L. J.: The x-ray treatment of carcinoma of the breast, *Canad. M. Ass. J.*, 1934, **30**: 173.
6. CLOPTON, M. B.: Cancer of the breast, *Surg., Gyn. & Obst.*, 1934, **58**: 438.
7. DUDGEON, L. S. AND BARRETT, N. R.: The examination of tissues by the wet-film method, *Brit. J. Surg.*, 1934, **22**: 4.
8. EBERTS, E. M.: The early diagnosis of cancer of the breast, *Canad. M. Ass. J.*, 1934, **31**: 9.
9. ERNST, E. C.: Radiological viewpoint of cancer of the breast, *J. Missouri State Med. Ass.*, 1934, **31**: 277.
10. GREEENOUGH, R. B.: Five year cures of cancer of the breast at the Massachusetts General Hospital, *Surg., Gyn. & Obst.*, 1934, **58**: 437.
11. GREENOUGH, R. B. AND TAYLOR, G. W.: Cancer of the breast; end-results. Massachusetts General Hospital, 1921, 1922 and 1923, *New Eng. J. Med.*, 1934, **210**: 831.
12. HARRINGTON, S. W.: Unilateral carcinoma of the breast treated by surgical operation and radiation, *Surg., Gyn. & Obst.*, 1935, **60**: 499.
13. HARRINGTON, S. W. AND JUDD, E. S.: Carcinoma of the breast—surgical treatment and results, five, ten and fifteen years after radical amputation, *Surg., Gyn. & Obst.*, 1934, **58**: 440.
14. HUTCHISON, R. G.: Interstitial radium treatment of carcinoma of the breast, *Brit. J. Surg.*, 1935, **22**: 465.
15. JUUL, DR., Finsen Institute, Copenhagen, personal communication.
16. KEYNES, G.: Radium treatment of primary carcinoma of the breast, *Canad. M. Ass. J.*, 1934, **30**: 24.
17. KEYNES, G.: Radium treatment of carcinoma of the breast, *Brit. J. Surg.*, 1932, **19**: 415.
18. KEYNES, G.: Radium treatment of primary carcinoma of the breast, *The Lancet*, 1928, **2**: 108.
19. KEYNES, G.: Radium treatment of carcinoma of the breast, *St. Barth. Hosp. Rep.*, 1927, **60**: 91.
20. KEYNES, G., personal communication.
21. LEVIN, I.: The relative value of surgery, radium and roentgen therapy in carcinoma of the breast, *Am. J. Roentgenol.*, 1935, **33**: 59.
22. MOORE, J. T.: Cancer of the breast—a curable disease, *Surg., Gyn. & Obst.*, 1934, **58**: 443.
23. OVERHOLT, R. H. AND ECKERSON, E. B.: The treatment of cancer of the breast and the results of operation, *New Eng. J. Med.*, 1934, **211**: 703.
24. PFAHLER, G. E. AND VASTINE, J. H.: Technique and results of irridation in carcinoma of the breast, *Am. J. Roentgenol.*, 1935, **33**: 41.
25. RICHARDS, G. E.: The treatment of chest-wall secondaries in breast carcinoma, *Radiology*, 1934, **23**: 280.
26. RICHARDS, G. E.: X-ray and radium in the management of breast carcinoma, *Canad. M. Ass. J.*, 1926, **16**: 358.
27. SCHWYZER, A.: Treatment of carcinoma of the breast—combined surgical and irridation treatment, *Minnesota Med.*, 1934, **17**: 683.
28. SIMMONS, C. G., TAYLOR, G. W. AND WALLACE, R. H.: Cancer of the breast: end-results. Massachusetts General Hospital 1924, 1925, 1926, *New Eng. J. Med.*, 1934, **210**: 836.

When thou perceivest that discord is in the army of the foe be thou at ease; but if they are united be apprehensive of thy own distress. Go and sit in repose with thy friends when thou seest war among the enemies; but if thou perceivest that they all agree span thy bow and carry stones upon the rampart.—*Maxim XXIV* of the Sheik Sa'di of Shiraz.

A fool is pleased by flattery (which is deceitful) like the inflated heel of a corpse that has the appearance of fatness. Take heed not to listen to the voice of a flatterer, who expects cheaply to derive profit from thee; if one day thou failest to satisfy his wishes he enumerates two hundred faults of thine.—*Maxim XXX* of the Sheik Sa'di of Shiraz.

THE ETHERINGTON-WILSON TECHNIQUE IN INTRATHECAL SEGMENTAL ANALGESIA

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IN October, 1934, W. Etherington-Wilson, F.R.C.S., of Torquay, England, addressed a group of surgeons, anæsthetists and senior medical students at McGill University, on "Intrathecal nerve root block: some contributions and a new technique", and showed a cinematograph film illustrating his experimental work with fluids of known densities in imitative spinal canals of glass. He calls this procedure "mock spinal analgesia". The subject had been presented previously at a meeting of the Section of Anæsthetics of the Royal Society of Medicine.[1] We were so favourably impressed with the perspicuity of the author, his ingenuity, and the exactness of this mode of spinal analgesia, that we decided to employ his technique at once, and are now able to report on 200 cases. In a personal communication Etherington-Wilson informs us that he still uses and is quite satisfied with his technique. Captain Andreasen,[4] of the Indian Medical Services, has published his experience with this method in 14 cases, and states: "I have found the above method to fulfil all the claims made for it". Lately he has written to Etherington-Wilson the following: "Since the delay in the publication of this article, I have done 300 cases; I find the method reliable, certain, quick and rational". We understand that several others are producing analgesia in this manner, and hope that their reports are forthcoming.

In the "mock spinal analgesia", Etherington-Wilson used glass tubes of different calibres and curves filled with a solution of the same specific gravity as that of spinal fluid, that is 1,007. Such a simulacrum is held in the upright position and an injection of percaine solution, specific gravity 1,003, coloured with methylene blue, is made through a side opening in the glass tube. Both fluids are of the same temperature. The rise of the lighter solution is timed and found to be constant. The lighter solution mixes most evenly during its ascent within the canal when this is vertical. It rises steadily and slowly, getting more sluggish in the higher reaches, because "it is mixing every centimetre of the way" with the heavier fluid. When the tube is at an angle, ascent of the lighter fluid is much more rapid than when it is vertical, and the drug will be concentrated along the upper longitudinal parts of the canal. From careful measurements, it was found that three main zones of analgesia could be obtained: (1) a low zone, bounded above by the first lumbar nerve segments (Poupart's ligaments), for operations on the lower limbs and perinæum; (2) a medium zone, bounded above by the tenth thoracic segments (umbilicus), for operations on the lower abdomen and pelvis; (3) a high zone, bounded above by the fifth thoracic segments (nipple area), for operations on the upper abdomen and lower thorax. Respectively, the doses and times suitable for these zones of analgesia are as follow:—

1. 10 c.c. percaine (1:1500) 20 to 25 seconds allowed upright.
2. 12 c.c. percaine (1:1500) 30 to 35 seconds allowed upright.
3. 15 c.c. percaine (1:1500) 40 to 45 seconds allowed upright.

With the possible exception of the case of a very long-backed patient, it is extremely important that no longer time be allowed than the maximum of 45 seconds; in fact it would seem to be very seldom necessary to have a patient in the upright position even this length of time. It must be remembered that the yonder upward distance is not illimitable—percaine at its extremity is bound to conquer and effect disaster. In practice the chosen quantity of percaine solution, 1:1500, warmed to the patient's temperature, is injected slowly without barbotage through the third lumbar space while the subject is sitting erect. At the end of the allotted number of seconds the upright position is quickly changed to that of recumbency and the head of the table is tilted slightly downwards. A careful study of Etherington-Wilson's original articles [1, 2, 3] is recommended.

Our 200* cases consisted of 91 (45.5 per cent) women from 15 to 84 years of age, the average age being 39.8; and 109 (54.5 per cent) men from 16 to 78 years of age, the average age being 41.8 years. As yet we have not been bold enough to emulate the author of this form of anæsthesia to the extent of applying it to the very young. In so far as the immediate results are concerned the older patients did remarkably well.

TABLE I.

PRE-ANÆSTHETIC MEDICATION

Drugs	*Usual doses in grains*	*Number of cases*
Nembutal and Scopolamine	3 and 1/100	96
Nembutal alone	3	30
Morphine, Scopolamine and Atropine	1/6, 1/100 and 1/150	28
Nembutal, Morphine and Atropine	3, 1/6 and 1/150	22
Morphine and Atropine	¼ and 1/150	13
Morphine alone	¼	8
None		3
		200

The pre-anæsthetic medicaments used are set forth in Table I. There was no particular or premeditated choice about these drugs; mostly, the matter was left to the resident surgeon. There can be no doubt of the advisability of giving sedatives beforehand; this is desirable to dispel fear, produce drowsiness, and establish amnesia. We, ourselves, prefer the combination of morphine and scopolamine. While in the majority of instances the results obtained with nembutal are quite satisfactory, this drug occasionally will produce some disappointing, idiosyncratic action common to all barbituric acid derivatives. We propose to use atropine more often, on account of its beneficially depressant effects on the parasympathetic nerve endings, its checking of secretions, and the stimulation it affords the respiratory centre.

Table II gives the data concerning the numerical distribution of patients according to the various quantities of percaine solution administered, the different lengths of time allowed for the upright posture, and the numbers of patients for each given sitting-up time. Within the specified limitations the amounts of solution as well as the lengths of time were chosen rather arbitrarily. Although *fait accompli*, present analysis reveals that both, more or less fortuitously, followed the middle course, that is, the 15 c.c. quantity was used more often than any other, and the times of 25, 30 and 35 seconds, taken respectively in 62, 58 and 53 cases, markedly exceed the others. We intend soon to adopt the newer precepts of the originator of this technique, by using smaller doses and allowing increased time for the vertical position.

*Since this paper was written 256 more cases have been done with equally satisfactory results.

TABLE II.

AMOUNTS OF ANÆSTHETIC; TIMES OF RISE; AND NUMBERS OF CASES

Amounts in c.c. of Percaine Solution	*Cases under the different times in seconds for rise of solution*						*Total cases*
	20	*25*	*30*	*35*	*40*	*45*	
20					2	1	3
19				1	1	1	3
18		1	2	6	2	1	12
17		5	2	6			13
16		2	4	2	1		9
15	3	29	22	18	6	2	80
14		5	5	2	1	1	14
13	1	2	3	1			7
12		14	13	6			33
10	2	4	7	11	2		26
Total cases...	6	62	58	53	15	6	200

The operations performed were: appendicectomies, 52; cholecystectomies, 15; cœcopexies and sigmoidopexies, 10; colostomies, 2; gastrectomy (partial), 1; gastro-enterostomies, 2; genito-urinary, 15 (including 10 on the prostate); gynæcological, 18 (including 13 laparotomies, 7 of which were total hysterectomies); herniorrhaphies (of all kinds), 49; hydrocele, 1; laparotomies (exploratory), 5; orthopædic, 16; rectal, 13 (including one excision of rectum, one biopsy and 11 for hæmorrhoids); and excision of saphenous veins, 1. The average operation time was 49 minutes, the longest being 191 minutes and the shortest 12 minutes.

Although nausea occurred in 70 (35 per cent) cases, it was usually slight during the early part of the operation, and rarely lasted longer than this; its incidence was never alarming.

Some degree of circulatory depression took place in practically every subject, but it was slight or moderate in the great majority of cases. The depression was marked during 26 (13 per cent) of the anæsthesias, but was easily overcome by treatment with stimulants or supporting solutions, or both. (By circulatory depression is meant a fall in blood pressure concurrent with a rise in pulse rate, premonitory of shock.)

Headaches occurred in 14 cases (7 per cent); 3 of these were moderately severe, but not entirely intractable. One patient, a man of 20, was very apprehensive. He was given 3 grs. of nembutal and 1/100 gr. scopolamine, and 15 c.c.

of percaine solution while in the erect posture during 25 seconds. The appendix was removed in 20 minutes; there was a moderate fall in blood pressure, no nausea, but headache persisted for four days. The second, a woman of 35, had had 3 grs. of nembutal and 1/100 gr. scopolamine, and 15 c.c. of percaine solution were allowed to rise in the spinal canal during 25 seconds. Appendicectomy and bilateral oöphorectomy were performed in 46 minutes. The blood pressure fell moderately; there was no nausea, but severe headache and considerable dizziness occurred whenever Fowler's position was attempted, for four days after operation. The third was a man of 29, very neurotic and temperamental. He had morphine, ¼ gr., with atropine, 1/150 gr. beforehand. The time of the rise of 20 c.c. of percaine solution was 40 seconds. Operation: appendicectomy and cœcopexy, lasting 108 minutes. The patient swooned during the introduction of the spinal needle; ¾ gr. of ephedrine was given intravenously. He complained of severe headache for 3 days thereafter, and vague pains in the back of his neck for several days more. This was one of our earlier cases by this method. Perhaps the dose of percaine was too large and the vertical position maintained for too long. But, we may not write of unspoiled truths or be ministers to philosophical curiosity.

Avoiding empiricism, we have not given stimulants as a regular course of action. Drugs may not be administered by rule-of-thumb. One-hundred and one of these 200 "spinal" anæsthesias were conducted without recourse to chemical excitants. The following is a list of the stimulating drugs used in the given numbers of cases:—

TABLE III.

Drugs	*Number of cases*
Ephedrine alone	66
Ephedrine and coramine	14
Ephedrine, coramine and carbon dioxide-in-oxygen	1
Ephedrine and carbon dioxide-in-oxygen	5
Coramine alone	7
Coramine and carbon dioxide-in-oxygen	2
Carbon dioxide-in-oxygen	4
None	101
	200

We are rather partial to ephedrine on account of its prompt action and its relatively prolonged effect. We prefer usually to administer such a drug intravenously. Perhaps carbon dioxide should be employed more often than it was in this series.

TABLE IV.

FAULTY ANÆSTHESIAS

No.	*Sex*	*Age*	*Pre-anæsthetic drugs* — *gr.*	*Percaine 1/1500* — *c.c.*	*Rise in secs.*	*Operation*	*Time in mins.*	*Other Anæsthetics*	*Remarks*
1	M	57	Nembutal, 3	15	25	Laparotomy, for strangulated Meckel's diverticulum	105	Ethylene and ether	25 minutes after injection, only partial anæsthesia. Induction of inhalation anæsthesia very difficult. History of alcoholism. Tetanic twitchings of face relieved by intravenous saline. Uneventful recovery.
2	F	29	Morphine, 1/6 Atropine, 1/150	12	35	Appendicectomy, cœcopexy, and sigmoidopexy	125	Cyclopropane during palpation, upper abdomen	Fall in B.P. considerable; relieved by ephedrine. No nausea, no headache.
3	M	57	Nembutal, 3	17	25	Plastic, on a large scrotal hernia.	75	Cyclopropane for 15 minutes.	Anæsthesia incomplete during handling of scrotum. Moderate fall in B.P. relieved by ephedrine. No nausea, no headache.
4	F	27	Nembutal, 3 Scopolamine, 1/100	15	25	Appendicectomy.	32	Cyclopropane.	Marked obesity. Inhalation anæsthetic necessary throughout. No depression.
5	M	22	Nembutal, 3 Scopolamine, 1/100	15	30	Appendicectomy.	38	Cyclopropane.	Very nervous and apprehensive. Light inhalation anæsthesia necessary. Complete relaxation. Uninterrupted recovery.

The apposite details of 5 cases of incomplete analgesia, or partial failure, are recorded in Table IV. To further elucidate these, it may be stated that in some instances the spinal needle might have become dislodged from its intrathecal position during the injection, that the doses of the pre-anæsthetic drugs should have been increased, and that leading questions, such as "does that hurt?" to an apprehensive person, ought to have been left unsaid.

We desire to report two unusual cases, the one of minor significance, the other precipitating considerable alarm.

CASE 1

A very obese woman, 42 years old, had had 3 grains of nembutal and 1/100 grain of scopolamine prior to the intrathecal injection of 15 c.c. of 1:1500 percaine solution while in the upright position for 25 seconds. The appendix was removed in 35 minutes; there was a moderate fall in blood pressure; she was slightly nauseated; and there was no headache. For 12 days after she had incontinence of urine, from which complete recovery occurred.

The other constituted an excruciating incident for all concerned. For a time exceedingly satisfactory results were being obtained with this "spinal" method, and someone might say that conditions so perfect must needs presage some set-back.

CASE 2

A man of 37 came for operation on inguinal hernia, having had 3 grains of nembutal and 1/100 grain of scopolamine; 15 c.c. of percaine solution were given while he sat erect for 30 seconds. The operation was begun; there was a gradual fall in blood pressure; marked pallor and partial loss of consciousness. Three-fourths of a grain of ephedrine was given intravenously. His condition became worse and breathing stopped 15 minutes after the beginning of the operation. The pulse was rapid but perceptible. The operation was discontinued, and artificial respiration performed, while carbon dioxide and oxygen were being administered under pressure. In the meantime coramine, adrenaline and caffeine were given intravenously, along with 5 per cent glucose solution. Recovery took place in half an hour, when the operation was resumed and finished 25 minutes later. The pulse was 120 and irregular. Within an hour anæsthesia was wearing off and the patient made an uneventful recovery. Although not robust, he was physically fit. He was operated upon 11 days later, when the appendix was removed and an umbilical hernia repaired under cyclopropane anæsthesia during 85 minutes. On this occasion, no untoward effects occurred. Although it would appear that some of the drug must have reached the respiratory centre, we are in a quandary adequately to explain this case. It is interesting to note that Elliott[5] has reported one of

TABLE V.

THANATOLOGICAL

No.	Sex	Age	Pre-anæsthetic drugs gr.	Percaine 1/1500 c.c.	Percaine 1/1500 Rise in secs.	Operation	Time in mins.	Cause of death	Remarks
1	M	78	Morphine, 1/6 Atropine, 1/150	12	25	Suprapubic systostomy and tapping hydrocele.	30	Septicæmia and renal insufficiency 5 months after.	Prostatectomy 1 month after, under cyclopropane. Died 4 months later.
2	F	76	Morphine, 1/6	10	35	Herniotomy (large strangulated ventral hernia).	55	Cardiac failure.	Died 4 days later. Fæcal vomiting beforehand and irregular heart.
3	F	21	Morphine, ¼	14	30	Explor. laparotomy; bilateral salpingo-oöphorectomy.	80	Tuberculous peritonitis.	Condition very acute at time of operation. Died 17 days after.
4	F	84	Morphine, 1/6	15	30	Excision of rectum (carcinoma).	130	Pneumonia 1 month later.	Excellent immediate recovery.
5	F	55	Nembutal, 3 Scopolamine, 1/100	15	35	Colostomy for carcinoma of rectum.	40	Gen. peritonitis and pneumonia 22 days after.	No immediate post-operative depression; autopsy confirmation.
6	F	53	Nembutal, 1½ Morphine, 1/6 Atropine, 1/150	15	25	Colostomy.	55	Pulmonary embolism 14 days after.	Autopsy: adeno-carcinoma of rectum and pulmonary embolism.
7	M	66	Nembutal, 3	14	25	Suprapubic cystostomy.	30	Cardiac failure 4 weeks after.	In the interim, 2 weeks after operation, prostate removed under cyclopropane.
8	M	59	Morphine, ¼ Scopolamine, 1/100	19	40	Partial gastrectomy (carcinoma).	191	Peritonitis.	Good immediate recovery. Parotitis on 3rd day. Wound broke open spontaneously on 6th day; difficult to close. Died on 8th day.
9	M	59	Nembutal, 3 Scopolamine, 1/100	20	40	Cholecystectomy.	70	Intestinal paralysis.	Marked fall in blood pressure and embarrassed breathing, relieved by ephedrine; dilatation of stomach and abdominal distention from the beginning. All attempts at relief failed. Died 6th day after operation.

extreme respiratory paralysis following caudal anæsthesia, in which 40 c.c. of novocaine were injected extrathecally; breathing was not re-established for 2 hours and 45 minutes.

Amongst the 200 cases here reported there were several hazardous risks; 9 of these patients died. Table V. supplies the data concerning them. It will be seen that none of these deaths can be attributed to percaine or the method of its administration. In each case the cause of death is not far to seek.

From this analysis of 200 cases of "spinal" analgesia by the Etherington-Wilson technique it is concluded that there should be marked drowsiness and amnesia, that minimal effective doses of percaine should be used, that the length of the vertebral column should carefully be taken into consideration when deciding on the quantity of solution and the time for the erect posture, and that with these precautions the method affords one more excellent choice in anæsthesia.

REFERENCES

1. ETHERINGTON-WILSON, W.: Intrathecal nerve root block. Some contributions and a new technique, *Proc. Roy. Soc. Med.*, 1933-4, **27** (pt. 1): 323.
2. *Ibid., Brit. J. Anæs.*, 1934, **9**: 43.
3. *Ibid., Anæs. & Analg.*, 1935, **14**: 102.
4. ANDREASEN, A. T.: The Etherington-Wilson technique of intrathecal nerve root block, *Indian Med. Gaz.*, 1935, **70** (No. 12): 683.
5. ELLIOTT, D. C.: Extreme respiratory paralysis following caudal anæsthesia, *Am. J. Surg. Anæs., Supp.*, 1925, **39**: 122.

MENTAL HYGIENE AND ITS RELATION TO INFANTS AND CHILDREN*

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THE physical health of the child is dependent on two factors — natural and acquired immunity to disease, and environment. Similarly, the mental health of the child is dependent upon natural or acquired immunity to nervous or mental disorders, and upon an environment conducive to normal mental growth.

Some children are born with a stable psychic or nervous system, are able to weather the storms of unsuitable environment and psychic shocks, and to grow up into comparatively normal adults. Others are naturally unstable and, if not carefully guided, may develop anti-social traits which will eventually land them in prison or in a mental hospital. On the other hand, if these unstable personalities are carefully brought through the early years they may later acquire immunity to unsuitable environment and become capable of living normal lives.

The effect of good or bad influences begins at birth, for from the moment the child is born it reacts strongly to its environment. In the hospital nursery one sees the well behaved, placid babies under the care of an experienced, calm, unhurried nurse, but when she is replaced by a new, inexperienced, over-anxious nurse, who handles the infant roughly or carelessly, who rushes around to get her work done in time, then listen to the chorus of squealing protests! How favourably a child responds to calm, unhurried routine at home, and how unfavourably to lack of routine or to the anxious, nervous care of an over-tired mother!

The pre-school age is the important period in the mental growth of the child, for during this period habits are formed and traits of character are established which it retains throughout its life. Psychiatrists state that many serious mental diseases, such as schizophrenia, actually begin in early childhood, and if the tendency is then detected and suitably corrected the disease may be aborted.

The cost to the Government of maintaining one person in a mental hospital for the duration of a normal life span would be roughly ten thousand dollars; how much more economical, then, to say the least of it, to prevent a child from becoming a chronic mental invalid? Environment may be interpreted as the atmosphere created by those who are in closest and most constant contact with the child. Hence, of paramount importance are the parents. Parents, often because of ignorance, but mainly because of indifference and lack of emotional control, are responsible for more warped mental lives in the world today than any other single factor. So many educated, intelligent people lose all perspective and common sense in regard to the raising of children when they become mothers

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and fathers; an understandable fact, as we are all more or less slaves to our emotions, but nevertheless one that often proves disastrous to the mental health of a child." But the ignorance or carelessness of parents are not the only factors to be reckoned with; perhaps just as frequently we find that it is the over-anxious, apprehensive care of a child that is undesirable. Many homes of the so-called better class, with parents of superior intelligence, may prove an unsuitable environment for children, who react markedly from the day of their birth to an atmosphere charged with over-anxiety and apprehension.

It is recognized that good physical health is almost imperative for good mental health, but how often do we forget that the reverse may be just as true? How often do we see children in poor physical health for no organic cause, when a careful investigation will reveal an environment unsuitable for that particular child, which, when corrected, will result in a surprising improvement in physical health. To be more explicit.—Let me enlarge from my personal experience with the Children's Aid Society, with which it has been my privilege to work for the past ten years. This Society has about five hundred children under its care, nearly all boarded out in carefully supervised foster homes. Not infrequently a child is seen who is not doing well physically, with unsatisfactory weight, lack of appetite, pale, listless, and generally miserable. His school record will be bad; he does not get on with other children; he may even be lying, stealing, and a bed-wetter. Careful physical examination reveals nothing organically wrong. He is in a good foster home where other children are placed and are doing well. Should such prove the case, the child is re-established in a different foster home and the results are astonishing—marked improvement in physical health, rapid gain in weight, a healthy, happy youngster. These children in the care of the Children's Aid Society are really living under better environmental conditions than many pampered darlings in some of our most exclusive homes; we cannot re-establish *them* in a new home where the environment may be more suitable.

What is to be done about the problem of bad environmental influence on the child? Interest is growing rapidly on this continent in methods of teaching parents some of the elements of mental hygiene. Classes are being organized, lectures are given, volumes are written on the subject. All these may be of some help, but I confess I am somewhat overwhelmed by the futility of teaching parents. It is doubly difficult for them to grasp and to accept these new precepts, when at the same time it necessitates their waging an unsuccessful battle against the dictates of their feelings. A method more hopeful of results is the commencement of instruction at a much earlier age, in fact, before boys and girls become parents, and I believe a course of mental hygiene should have a prominent place in the curriculum of every high school and college in the country. In these places children are instructed in principles which should fit them for life; what more important phase of life than the successful rearing of a family? In these modern days one goes to school or college to learn how to raise cows or pigs or chickens in a successful manner, but men and women plunge into parenthood, knowing nothing of baby culture, and babies just grow.

Fortunately, we have several methods at hand which are of inestimable value in the prevention and cure of mental ill health, most important of which are nursery schools, summer camps, and boarding schools.

The nursery school is now a well established institution, and indispensable to any community with its supervised games and play for groups of children of the same age, under the watchful eye of supervisors who have had instruction in mental hygiene, and *who have a natural aptitude for getting on with children* and controlling them. All this works wonders for children's mental health, and it is difficult to believe the marked improvement in a child's behaviour and habits that two or three hours a day spent in such a nursery school can effect.

Take, for example, D.B., three and a half years of age, an only child of middle-aged parents, carefully and intelligently reared, but always surrounded by an atmosphere of over-anxious care. As to be expected, he developed symptoms of mental ill-health, bad eating habits, bad sleeping habits, phobias, anxiety, nail-biting, bed-wetting, and tantrums. With no change in home environment, but two hours daily in a good nursery school, a complete cure in less than two weeks was effected, transforming him into a happy child who slept the night through with a dry bed, who ate his meals properly, played alone in the garden; no nail-biting, no tantrums.

Summer camps offer a splendid environmental change for boys and girls, especially if conditions at home are not suitable. Such camps can be made doubly useful if the supervisors know

the principles of mental hygiene, and especially if they have a flair for getting on with children. The opportunities offered in these camps for leadership and responsibility are the best possible curative measure for many boys and girls who are adjusting badly at home, and the good results obtained are usually permanent when the child returns; he or she has learned the satisfaction of doing constructive rather than destructive work.

Many people in this country of ours are very sceptical of the benefits derived from private boarding schools. They vaguely think of "pampering" and "snobbery" and "class consciousness". I believe that in this part of Canada in our good private schools (and there are a number) children are taught, among other things, how to live. I have seen very little snobbery, and certainly no pampering, but here again it is very important for the head-master or mistress to have a special aptitude for handling children and for knowing his boys or her girls thoroughly.

The improvement in mental health and stability of character that children attain when placed in a good boarding school from a home of unsuitable environment is tremendous.

E.T., a large, overweight, overgrown boy of twelve years, who had suffered for some years from a severe illness, but later became organically sound, had developed an invalid complex. If he forgot his ill health for a moment his mother was ready to remind him of it, and she was most happy when nursing him. At the public school he was backward in his school work, teased by other boys, quite unable to take part in any games or sports, and when met by a difficult situation prone to develop a terrific headache. He was about the most useless and unlikeable boy one could imagine. On being placed in a good boarding school (much to the secret chagrin of his mother) he at first seemed hopeless, and spent most of his time weeping, but soon he began to look around and acquire some glimmerings of manhood. In a short time he asked to be allowed to take part in some of the games and to join the Scouts. From then on his progress was splendid; he forgot his illnesses, made many friends among the boys, and did passably well in his school work.

In this paper I have attempted to emphasize the importance to the pædiatrists of the problems of mental hygiene that so frequently arise in every-day practice, for there is little doubt that this branch of medicine, which is of such vital consequence, has been grossly neglected. Time does not permit the discussion of individual problems and the means of their control; I have, therefore, endeavoured to confine myself merely to the broader outlines, giving my ideas and recommendations for such practical methods of treatment as are able to produce the best results

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THE VITAMIN-A CONTENT OF SOME MEDICINAL COD-LIVER OILS SOLD IN EDMONTON

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IN a report on cod-liver oils made by Drummond and Hilditch[1] to the Imperial Economic Committee particular emphasis is laid on certain non-biological factors which may materially affect the vitamin-A potency of an oil before it reaches the consumer. To minimize the destruction of vitamin-A by photo-chemical oxidation they recommend that the containers, dark, amber coloured bottles, should be completely filled with the oil and should be kept in a cool, dark place. Edmonton is far removed from the source of supply, so that a stock of cod-liver oil may be in the hands of the retailers for several years. Further, it is a common practice of the wholesaler and retailer to purchase large quantities of oil in bulk and to repack smaller quantities in clear glass bottles as required. It is very probable that marked deterioration of the oil results from continued exposure of the reserve supply to the air, and that further destruction of vitamin-A takes place during the period that the bottles stand on the shelves in a warm, sunny room.

Having regard to these facts, it was our belief that a large amount of money was being spent on the purchase of oils of very little therapeutic value so far as vitamin-A is concerned, and that a guarantee of vitamin-A potency given in good faith by the manufacturer might be virtually worthless at the time the oil was purchased.

Experimental

So long as biological methods (rat assay) alone were available for the determination of vitamin-A it was impossible, from the standpoint of facilities and expense, to conduct a sufficiently comprehensive investigation which might yield reliable information in regard to the points just raised. In recent years, following upon the great advances which have been made in our knowledge of the chemical and physical properties of vitamin-A, a rapid and reliable procedure has been elaborated for its quantitative estimation, which involves the measurement of the intensity of absorption of radiations in the ultra-violet (328 m.u.) by solutions of the oil or of the non-saponifiable fraction of the oil. This method was used to obtain the data presented in Table I. A Bellingham and Stanley quartz spectrograph, fitted with a rotating sector photometer, was employed. The details of the procedure need not be entered into here.*

The Vitamin Standardization Conference,[7] in adopting the spectrophotometric method as a standard, stated that, "within certain definite conditions, measurement of the co-efficient of absorption (E) at 328 m.u. affords a reliable method for measuring the vitamin-A content of liver oils and concentrates".

The samples of cod-liver oil were purchased on the local market during the winter 1934-35 and stored in a refrigerator. The information on the labels was recorded. Many of the samples were labelled simply "Cod Liver Oil", with the retail pharmacist's name. Usually there was no vitamin A or D potency stipulated, but often a statement to the effect that the source was either Newfoundland or Norway.

The free acidity, saponification value, iodine number, specific gravity and refractive index of each of the oils, and the amount of non-saponifiable matter in a few of the oils were determined by the standard methods of the British Pharmacopœia (1932). With the exception of oil No. 117 the values obtained were always within the range given for cod-liver oil by a number of standards, thus indicating that none of these oils was adulterated.

* Various aspects are discussed in the papers of Morton and Heilbron[2]; Drummond and Morton[3]; Chevallier and Chabre[4]; Coward, Dyer, Morton and Gaddum[5]; and Gillam and Morton.[6]

Discussion of the Results

The first absorption measurements were made on the Reference Cod Liver Oil obtained from the U.S.P. Revisions Committee. This oil has been biologically standardized by numerous laboratories in the United States and in England, and found to contain 3,000 International Units (I.U.) of vitamin-A. Our analysis of the reference oil (2,554 I.U.) is 446 I.U. below the biological value. This result is, however, in agreement with that of Morgan, Edisbury and Morton.[8]

In the same class of oils great variations in vitamin-A content are seen from Table I. It will be observed that where the determination has been made on the non-saponifiable fraction in all cases there is a reduction in the number of units of vitamin-A. The reduction is not constant but varies from 8 to 28 per cent, and bears no definite relation to the percentage free fatty acids nor to the iodine absorption number of the oil. Where the non-saponifiable matter has not been analyzed the results can only be taken as representing maximum values. At least half of the oils examined are of relatively low vitamin-A content. It is of interest to note that the majority of the poor oils are those which have been bottled by the pharmacist from bulk oil obtained from the local wholesaler. These results, however, are not significantly different from the low values obtained for Norway oils purchased in the original package.

The rate at which an oil may deteriorate is indicated by the following observations. The vitamin-A content of a sample of oil obtained directly from the manufacturer* was found to be 2,240 I.U. (oil) and 2,048 I.U. (non-saponifiable fraction). A clear glass bottle was half-filled with this oil and allowed to stand in the laboratory for five months. A re-analysis gave 1,110 I.U. (oil). Another consignment of oil from the same source which was being continually drawn-on for feeding purposes was found, after standing in a refrigerator for two years, to contain only 880 I.U. (oil) or 704 I.U. (non-saponifiable fraction).

In Table I we have also compared our results with the few assays advertised by the manufacturer. We have not designated the manufacturer of each package oil because we have no

* W. A. Munn, St. John's, Newfoundland.

evidence that our analyses indicate the actual potency of the oils at the time they were first distributed. However, a list of the names of the manufacturers is appended to this paper. The vitamin-A content of oil No. 103 is exceptionally high. A sample of the same brand was obtained directly from the manufacturers,* and found to contain 2,752 I.U. (oil). There was no indication from the physical and chemical characteristics that oil No. 103 had been supplemented. According to the British Pharmacopœia the non-saponifiable matter in cod-liver oil should not exceed 1.5 per cent. Analyses of oil No. 103 gave 1.4 per cent non-saponifiable matter, while oil No. 117, which was advertised as "vitamin fortified", contained 1.8 per cent non-saponi-

* National Laboratories Limited, Halifax, Nova Scotia.

TABLE I.

SHOWING THE VITAMIN-A CONTENT, ETC., OF MEDICINAL COD-LIVER OILS SOLD IN EDMONTON

			International Units† of Vitamin-A		
			Found		*Advertised*
	Cost per 8 oz.	*Free fatty acids Per cent*	*Oil*	*Nonsaponifiable fraction*	
Group I. Original Package:					
A. Newfoundland Oils—					
103c*	47c	0.21	4069	3744	750—1,000
111d	67c	0.41	1280	....	1,750§
112b	71c	0.55	1424	1021	....
116c	50c	0.43	1120	....	700
117e	...	0.47	2688	2224	3,000
B. Norway Oils—					
106a	38c	0.35	640	586	....
113b	...	0.89	416	....	.....
115a	30c	0.33	640	....	.....
124e	50c	0.42	880	704	1,400
Group II. Bulk oil purchased from the local wholesale and repacked by the retailer:					
A. Newfoundland Oils:—					
100a	35c	0.36	544	.....	.....
B. Norway Oils—					
101a	35c	0.63	384	....	.....
102a	37c	0.36	742	....	12,000‡
104a	40c	0.55	811	....	.....
105a	30c	0.63	496	....	500‡
108a	...	0.47	752	....	.....
109a	...	0.36	688	....	.....
Group III. Bulk oil purchased directly from the manufacturers and repacked by the retailer:					
A. Newfoundland Oil—					
107c	35c	0.47	1280	....	.....
B. Norway Oil—					
110a	25c	0.51	1151	....	.....

*The letter in the index number indicates the type of container in which the oil was packed:
a—Clear glass.
b—Clear glass—in carton.
c—Clear glass—wrapped in amber cellophane.
d—Amber glass.
e—Amber glass—in carton.

†International Unit—Observed extinction coefficient $E\begin{cases}1\% \\ 1\text{ cm.}\end{cases}$ multiplied by 1600.
Calculated on assumption that pure vitamin-A has a value $E\begin{cases}1\% \\ 1\text{ cm.}\end{cases}=1600.$ Carr and Jewell.[9]

‡Nature of the "units" not indicated.

§Recalculated from U.S.P. unit, using the factor 1.4.

fiable matter. Oil No. 124, which when analyzed was found to be relatively low in vitamin-A potency, was advertised locally as being fed to the Dionne quintuplets.

SUMMARY

This investigation was undertaken, knowing that supplies of cod-liver oil were often in the hands of the local wholesalers and retailers over a period of years under conditions which, we believed, must adversely affect their therapeutic value. Eighteen different samples were purchased in retail stores in Edmonton and amongst other analyses their vitamin-A content was determined by the spectrophotometric method. The results confirmed our suspicion in that more than half of these oils were found to contain an amount of vitamin-A considerably below the amount we have sometimes found in oils of "cattle and poultry" grade.

We considered, further, that marked deterioration of an oil must result when it is purchased by a retailer in large quantities in bulk and over an extended period repacked in smaller quantities as required. All of the oils which were known to have been handled in this manner did have a low vitamin-A value. This could not be definitely attributed to deterioration during the handling of the oil, since, with one exception, all of these samples were of Norwegian origin, and oils from this source, purchased in the original package of the manufacturer, were also poor in vitamin-A. Newfoundland oils are not procurable in bulk on the local market to any significant extent.

It is our opinion that the care which the manufacturer exercises in an endeavour to conserve the vitamin-A content of his product during its processing may be rendered worthless as a result of the treatment which the oil receives at the hands of the wholesaler and retailer. Cod-liver oils should, obviously, be required to conform to some standard so far as their vitamin content is concerned. In the case of vitamin-A we believe the spectrophotometric method of analysis makes possible the enforcement of such standards in a relatively inexpensive manner. Control of the length of time that a particular oil is in circulation (dated oils), and instruction to the wholesaler and retailer in regard to the proper handling of bulk oils in particular and cod-liver oils in general would be steps in the right direction.

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REFERENCES

1. DRUMMOND, J. C. AND HILDITCH, T. P.: The relative values of cod-liver oils from various sources. Empire Marketing Board Report No. 35, 1930. His Majesty's Stationery Office, Kingsway, London, W.C.2.
2. MORTON, R. A. AND HEILBRON, I. M.: The absorption spectrum of vitamin-A, *Biochem. J.*, 1928, 22: 987.
3. DRUMMOND, J. C. AND MORTON, R. A.: Observations on the assay of vitamin-A, *Biochem. J.*, 1929, 23: 785.
4. CHEVALLIER, A. AND CHABRE, P.: Determination of vitamin-A in oils by a spectrophotometric method, *Biochem. J.*, 1933, 27: 298.
5. COWARD, K. H., DYER, F. J., MORTON, R. A. AND GADDUM, J. H.: The determination of vitamin-A in cod-liver oils, *Biochem. J.*, 1931, 25: 1102.
6. GILLAM, A. E. AND MORTON, R. A.: The antimony trichloride test and the ultra-violet absorption of liver oils, *Biochem. J.*, 1931, 25: 1593.
7. Quarterly Bulletin of the Health Organization, League of Nations, 1934, 3: No.3.
8. MORGAN, R. S., EDISBURY, J. R. AND MORTON, R. A.: A discrepancy between biological assays and other methods of determining vitamin-A, *Biochem. J.*, 1935, 29: 1645.
9. CARR, F. H. AND JEWELL, W.: Characteristics of highly active vitamin-A, *Nature*, 1933, 131: 92.

SOURCE OF PACKAGE OILS

National Laboratories Limited, Halifax, N.S.
E. R. Squibb and Sons, Toronto, Ont.
Ayerst, McKenna and Harrison, Montreal, Que.
Parke-Davis and Company, Walkerville, Ont.
Abbott Laboratories, Montreal, Que.
Allen and Hanbury, London, England.
Toronto Pharmacal, Toronto, Ont.
W. A. Munn, St. John's, Newfoundland.
United Drug Company, Boston, Mass.

THE SAFE PERIOD.—de Carvalho Azevedo in the first Brazilian publication on this subject states that as he is on religious grounds opposed to the ordinary contraceptive methods and induction of abortion, during the last four years he has made a practical study of the method of Ogino and Knaus suggested by them in *Zentralbl. f. Gynäk.*, 1932 and 1933. Both these writers agree that in women with regular menstruation ovulation takes place fourteen to sixteen days before menstruation. According to Knaus the fertile period is five days, and according to Ogino eight days. The author, who adopts the latter's view, considers that the fertile period lasts from the nineteenth to the twelfth day before menstruation, so that coitus should not take place during this period if conception is to be avoided. Among fifty cases in which the author tried this method there were only two failures.—*Ann. Bras. de Gynecol.*, June, 1936, p. 474. Abs. in *Brit. M. J.*

Case Reports

AN UNUSUAL CASE OF CIRRHOSIS OF THE LIVER

BY L. C. MONTGOMERY, M.D., F.R.C.P.(C.),

Montreal

The following case has been thought worthy of record on account of its unusual features, and the difficulty of its diagnosis except after a long period of observation.

CASE REPORT

The patient, a Czecho-Slovakian labourer of 51, was admitted to the Montreal General Hospital on May 22, 1935, complaining of "soreness in the stomach". A tentative diagnosis of cirrhosis of the liver had been made in the Medical Outdoor.

His family history was negative. The only point of importance in his personal history was that he had been accustomed to drink whisky for many years, but in what quantity could not be ascertained.

History of illness.—The patient had had a cough with some muco-purulent sputum for some years, and was becoming dyspnœic on exertion. He had seen dark red blood in his stools at intervals in the last three years. A dull aching pain had developed in his epigastrium about three months before admission; he referred this to the entire upper abdomen. The pain did not radiate, was not affected by the taking of food, and would disappear for a few days at a time. No nausea or vomiting. The appetite was good, but he had lost 33 lbs. in the previous year, and in the same period had noticed his skin becoming darker, with some itchiness. There were no other symptoms of note.

Physical examination.—The patient was emaciated, with a pulse of 76 and temperature of 98°. There was a subicteroid tinge to the sclera and skin, with dilated venules in the cheeks. The mucous membranes were definitely anæmic. His pupils were equal and active; tongue coated, pale, with no atrophy of the edges. The voice was husky, and there was a frequent, hoarse non-productive cough. Axillary, inguinal and femoral glands were all somewhat large, hard and discrete. The radial, brachial and temporal vessels were sclerosed and tortuous. Blood pressure was 100/60.

The lungs showed no abnormality. The level of the diaphragm was at the 4th interspace in the right mid-clavicular line. The heart sounds were clear; the relative cardiac dullness extended to 11 cm. to the left, and 3 cm. to the right of the mid-line, reaching the 3rd interspace above.

The abdomen showed marked prominence in the epigastrium and hypochondriac regions. The mid-abdomen was scaphoid and the lower abdomen prominent; some distension of the hypogastric and long thoracic veins; no caput Medusæ. The epigastrium and both hypochondria were occupied by a rounded, firm mass, with an irregular lower border. This extended three fingers breadth below the left costal border, and there gives the impression of spleen. It is questionable whether it was separated from the mass in the epigastrium or not.* It was not tender, and was dull on percussion. Traube's space was obliterated. The flanks were clear. The genitalia were normal. Rectal examination showed one large external hæmorrhoid. The prostate was not enlarged. There was no œdema of the limbs, and the reflexes generally showed nothing abnormal.

The laboratory findings, on admission, were as follows.

Urine: specific gravity, 1.020; no sugar or albumin; no abnormal microscopical findings.

Stool: firm, light brown; occult blood shown by benzidene test; no ova, no pus.

Blood: red cells, 3,360,000; white cells 11,400; hæmoglobin 53 per cent (S.). The differential count showed, polymorphonuclears, 62; lymphocytes, 26; eosinophiles, 5; monocytes, 2; degenerated forms, 1. The smear showed no gross abnormality. The chemical findings were: urea-nitrogen, 11 mgm.; creatinine, 1.43; sugar, 0.107 per cent; van den Bergh, 0.6 units mgm. per 100 c.c.; urobilinogen, 1/100. The Wassermann test was negative, both on admission and later on.

The ocular fundi were pale, but otherwise normal. Later, two small hæmorrhages were noted. The movements of the vocal cords were normal.

X-ray examinations carried out from time to time gave the following information. (1) The lungs showed no evidence of infiltration or consolidation. (2) A barium enema revealed nothing. (3) Combined fluoroscopic and serial film examination of the gastro-intestinal tract showed a shadow in the left upper quadrant, suggesting an enlarged spleen. (4) A bone cyst, probably old, was found in the upper third of the left femur at the level of the intertrochanteric line.

A fractional test meal showed normal acidity in all the specimens, but 45 minutes after the first specimen had been withdrawn the patient vomited 150 c.c. of bright red blood, with some dark clot. The stool was now definitely tarry.

At this stage the impression gained was that of a neoplasm, either primary or secondary, in the liver. No definite conclusion regarding the abdominal mass could be arrived at, and uroselectan was given on June 3rd, to help in ruling out the possibility of the mass being kidney. This examination was not entirely satisfactory, but showed that there was incomplete filling of the right renal pelvis, with some distortion of the left kidney. Whilst not definitely excluding new growth or early inflammatory changes in the kidneys, these were at their normal levels, and showed no evidence of hydronephrosis.

On June 4th the patient vomited about 100 c.c. of currant-jelly coloured blood, followed by 30 c.c. of "coffee ground" material. He was more emaciated, but showed no change in colour. The abdominal mass was unchanged in contour. The red cells were down to 2,800,000; the white cells, 4,200; hæmoglobin, 40 per cent (S.). Van den Bergh, 0.2 units; urobilinogen, 1/250; blood sugar, 0.114; blood urea, 18. The temperature chart showed a slight almost daily rise.

On June 7th a cystoscopic examination by Dr. F. S. Patch showed a normal pyelogram, and the kidneys were ruled out as a possible primary focus. Other examinations made from time to time were as follows. (1) Basal metabolism test. This was plus 41 on June 5th, and plus 27 on June 18th. (2) An intradermal test with echinococcus antigen was done, with negative results. (3) On June 19th, 25 c.c. of thorium dioxide was given intravenously, in 200 c.c. of water, in order to visualize the liver and spleen. This was repeated on June 21st. The x-ray plates taken at intervals of 24 hours after these injections showed distinct enlargement of the spleen, but no evidence of metastases in the liver. There was no discomfort subsequent to these injections. (4) A biopsy on a gland from the left inguinal region

* At the time of one examination it was recorded that the mass could be detected as lying on or in the anterior surface of the liver.

showed normal lymph node structure and the differential stain of the tissues for iron showed no evidence of hæmochromatosis. (5) An intradermal tuberculin test with 1:1,000 O.T. was negative. (6) Visualization of the gall-bladder by the dye method showed this organ to be of normal function. (7) A Congo-red test showed removal of 23 per cent from the circulation in one hour. (8) A sugar time curve showed evidence of delayed tolerance and assimilation.

On July 5th it was noted that the urine showed a trace of glucose, for the second time since admission. The clinical comment at this stage was to the effect that in spite of the continual loss of blood in the stool the patient was maintaining his strength and spirits, and ate well. "These things," it was remarked by Dr. A. H. Gordon at the time, "do not correspond with neoplasm." The blood, however, showed 2,020,000 red cells, with 33 per cent hæmoglobin, and the cells showed variation in size and shape. The fragility test showed no abnormality, and the other elements were within the normal limits.

The tentative diagnosis of neoplasm was now finding very little support. Other possibilities considered were, hæmolytic jaundice, amyloid disease, Banti's disease, and some unusual form of hepatic cirrhosis. On July 23rd there was again copious hæmatemesis, followed by tarry stools and a further drop in the red cells to 1,390,000; hæmoglobin, 25 per cent. The blood sugar was now 0.344 per cent and pancreatic involvement was considered. The van den Bergh was 0.4 units, and the urobilinogen 1/500. The diastatic index of the urine was 19,550 Wohlgemuth units of activity, *i.e.*, within normal limits. The copper content of the urine was 1.1 mg. per litre and 2.75 g. per 24-hour specimen, which was about four times the average normal amount in 24 hours. Two days later, as there was still a faint trace of sugar in the urine, he was put on insulin with a diet of carbohydrates 236, fat 42, protein 102.

Two weeks later the following note was made. "The patient has an enormous appetite and sleeps well. The mass in the abdomen remains unchanged in size and consistency. The stool shows no occult blood. There is some œdema of the ankles and moderate tachycardia. Blood pressure is 104/64." At this stage, on account of the persistent anæmia, the patient was given three transfusions of blood, of 250 c.c. each with 250 c.c. of Ringer's solution, with most striking effects on his general condition. In a few days he was up and about the ward, and when examined on August 21st it was definitely concluded that the diagnosis of malignancy must be abandoned. In view of the disturbed sugar metabolism, hepatic cirrhosis was considered as most likely, with the pigmentation a manifestation of hæmochromatosis.

There was apparent improvement in the patient's condition from now on, with no change in the physical signs, and absence of bleeding from the bowel, but on September 29th he complained of epigastric pain, and vomited about 2,000 c.c. of bright red blood. His pressure dropped to 56/36, and next morning he had more hæmatemesis. The possible causation suggested was either, (*a*) ruptured œsophageal varix, (*b*) duodenal ulcer, or, (*c*) ruptured aneurysm. In view of the history the first-named seemed to be the most likely. The patient sank rapidly and died the following day.

Pathological examination.—The following abstracts from the autopsy report, which was extremely long and carefully detailed, contain the most significant points.

The peritoneal cavity showed no free fluid. The stomach was greatly dilated, and the liver and spleen showed great enlargement. The liver was enormous, weighing 2,990 g., or nearly double the normal. It was extremely firm, with a smooth capsule and a fatty appearance. The left lobe was almost as large as the right. On section it felt very tough, and the lobules stood out definitely. Microscopically, there was a very great increase in connective tissue throughout, showing in the portal spaces and the tissues between the lobules. In this connective tissue there was a sprinkling of lymphocytes with some polymorphonuclears. In places these cells were in discrete nodules. The liver cells were swollen, sometimes uniformly and sometimes in patches. Stains for hæmosiderin gave no Prussian Blue reaction. In many of the liver lobules the cells appeared large, with displacement of the central vein. There was probably a hypoplasia of the polygonal cells, which would account for the size of the liver.

The spleen weighed 700 g., or nearly five times the normal. It was roughly oblong in shape, with a smooth capsule, and soft to the touch. On section, the markings were found to be obliterated, and much of the tissue came away with the knife. Microscopical examination revealed a diffuse generalized fibrosis, with large sinusoids.

In the œsophagus there was found, 7 cm. from the opening into the stomach, a shallow circumscribed area 2 mm. across, in which there was a loss of tissue extending into the submucosa, which was infiltrated with blood for several centimetres. Injection of the superficial vein just beneath the mucosa demonstrated a ruptured varix.

The final pathological diagnosis was, portal cirrhosis of the liver with hepatomegaly, splenomegaly, and œsophageal varices.

In summary, this was a case of advanced portal cirrhosis in which the differentiation from malignant disease was only made with certainty after prolonged observation and a variety of examinations.

I am indebted to Drs. A. H. Gordon and L. J. Rhea for permission to publish this case.

HYPOGLYCÆMIA: REPORT OF A CASE*

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The subject and literature of hypoglycæmia has been very thoroughly reviewed by Wauchope,[1] Whipple *et al.*,[2] and Harris.[3] Although low blood sugars had been recognized in experimental animals since the time of Claude Bernard, and in rare clinical cases the symptoms associated with them were not recognized until Mann's work on liver extirpation in dogs and hypoglycæmia in 1921, and the condition did not become an accepted clinical entity until Banting and his associates noted the peculiar effects of an overdosage of insulin in 1922. These effects were often most dramatic, as all clinicians who first used insulin will remember.

In 1923 and 1924 several cases of low blood sugars were reported in which nervous phenomena were noted and in which the symptoms cleared up with carbohydrate feedings. In 1927

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Wilder reported a case of hypoglycæmia due to carcinoma of pancreatic islet tissue, and in 1929 the first surgical cure was reported by Roscoe Graham, when an adenoma of the pancreas was excised with resulting cure. Since that time some 21 cases have been reported in which cure has followed removal of one or more adenomata of islet tissue. In addition a large number of cases have been reported in which dietary measures have sufficed. There is also much evidence to suggest that hypoglycæmia is fairly common in a mild form and often unrecognized.

We report the following case because it illustrates the difficulty often encountered in making a diagnosis and the possible confusion with other nervous conditions, and because it was also a surgical cure.

CASE REPORT

The patient was a woman of 49 years. Her history went back five years. She had had peculiar attacks which began usually with severe headache and weakness. She did not remember any details of these, but said she fainted and was usually put to bed, when the attack would gradually pass off and she would be quite well again. An adequate account of her attacks could not be obtained owing to the death of her husband several months before admission, and no one else could be found who had seen many of them. She quoted her husband as saying that sometimes she became irrational and on other occasions simply seemed to go to sleep. She frequently had symptoms on rising in the morning, and he managed these by keeping her in bed until he had given her a cup of tea, after which she was usually able to get up. She also recalled that her husband used to say that the only way to keep her well was to feed her little and often. It is important to note that the above history was only obtained after her recovery.

She did not seek medical aid until June 20, 1935, when an attack developed which started like previous ones, but became more severe, and she was admitted in convulsions an hour and a half after the onset. On admission she was unconscious, rigid, cyanosed and twitching. She rapidly regained consciousness and passed an uneventful night. She had several attacks after this and was most difficult to manage during them. Her appearance at the height of the attack was quite suggestive of acute alcoholism, and on one occasion she had to be put under full restraint. Sedatives were only partially successful in quietening her. During the following days, with repeated acute phases, she took very little food and vomited considerably. On one occasion she was given 100 c.c. of 50 per cent glucose solution intravenously, and the house surgeon records that this was without effect but it is very interesting to note that the nurse's notes say that she was quiet and fairly normal after the glucose for four hours, when the convulsions recurred. Physical examination was essentially negative and no localizing signs could be obtained. It was thought that she had some optic œdema, but this was not confirmed by the ophthalmologist, who merely recorded vitreous opacities and myopia. During the attacks it was noted that her pupils were dilated and unequal, and a doubtful Babinski sign was obtained on several occasions. The cerebrospinal fluid showed slightly increased globulin, 9 lymphocytes, and the mastic test was reported as 23210000.

An intracranial lesion was suspected, and, as she did not improve, a ventriculogram was done. The lateral ventricles were well visualized, but the third and fourth were not, and it was thought that this indicated possible disease in their region. As a post-operative measure she was repeatedly given hypertonic glucose intravenously and was perfectly well after the operation. She continued well for several days and was discharged in good condition, but undiagnosed.

The patient then disappeared from observation until February 17, 1936, when she was readmitted to hospital in a semicomatose and delirious condition. She was quietened successfully with sodium-luminal hypodermically. She said that her attacks had recurred three days after discharge from hospital last June, but that she had had no medical attention. Her attacks occurred daily and none of them were violent. They were always preceded by fasting, due to nausea and anorexia, and by headache.

While in hospital she again had numerous attacks all of which were most severe and violent. They were always preceded by a feeling of weakness and by double vision, and after a few days she was often able to warn us of the impending onset of an attack by this latter symptom. Most of the attacks occurred about 4.30 p.m., and it was noticed that she rarely ate any lunch before them, and, if she did, she vomited soon after. During these later attacks her pupils were widely dilated. She appeared unconscious of her actions and often talked irrationally. She was restless and threw her limbs about purposelessly and in an uncoordinated manner. She was markedly confused and often violently resisted any attempt to examine or restrain her. She frequently shouted and screamed and talked incoherently. The reflexes were markedly hyperactive, and on a few occasions a positive Babinski sign was elicited. There were no localizing signs at any time. Many attacks were more or less aborted by the free use of sedatives, but after she quietened down she usually required some hours to return to normal, and during this latter period she had hallucinations and delusions. For example she insisted that water was pouring down the corridor outside her room, and on other occasions she said that her bed was attached to a fast-moving train. These were so real to her that she remembered them for some time afterward. On complete recovery from an attack she was normal mentally, but was exhausted and weak. She laughingly denied any memory of the details of the attack, and thought that we were exaggerating when we attempted to assist her to recall the details.

During one of her attacks the intern managed to obtain a specimen of blood, and it was found to contain only 30 mg. of glucose per 100 c.c. of blood. Thus a diagnosis of hypoglycæmia was proved. A sugar tolerance test was attempted, but abandoned when the glucose was vomited. However the fasting blood sugar at this time was but 40 mg. per 100 c.c. Several other blood analyses were done during the convulsions and all were of the same order. In the normal interludes the blood sugar never exceeded 70 mg. In the most severe attack the respiratory rate dropped to two per minute and she became deeply cyanosed and pulseless. She improved with caffeine and oxygen. Later adrenalin was given without appreciable effect.

As remarked before, it was extremely difficult to do anything with her during an attack, but on March 2nd the intern managed to introduce 5 c.c. of 25 per cent glucose into a vein before she succeeded in jerking her arm away from the restraint exercised by two nurses. With this small amount of glucose she promptly quietened down, but was not normal for several hours. The following day she was put on small high carbohydrate meals at two hourly intervals, and urged to take them. She was also trained to call for help as soon as double vision developed, and in this way all further attacks were prevented. She was now normal mentally, but in poor physical condition owing to exhaustion.

A lumbar puncture was done on February 26, 1936, and the cerebrospinal fluid showed slightly increased globulin, 9 lymphocytes, and a negative mastic reaction. Another puncture was done a week later, and this time

the fluid had a definitely increased globulin; the cells were increased to 16 lymphocytes, and the mastic test now showed a paretic type of reaction, *i.e.*, 5553221000000.

Diagnosis.—Hypoglycæmia was proved but the cause had not been determined. There was no evidence of Addison's disease. Her basal metabolism was plus 20 per cent, and there was no suggestion of pituitary or thyroid disease. Thus the only other possibilities were hyperinsulinism and a possible cerebral lesion involving the sugar centre in the pons. This latter highly theoretical possibility would not have been entertained if it had not been for the suggestive findings in the ventriculogram taken several months previously, the marked cerebral symptoms in the attacks, and the peculiar cerebrospinal fluid findings. However it was felt that if a cerebral lesion had existed there would have been localizing signs after several months. There is no record in the literature of similar findings in hypoglycæmic cases, but it is significant that in two cases of McLenahan and Norris that came to autopsy there were marked central nervous findings, including extensive Nissl's degeneration in the ganglionic cells and marked swelling of the axon sheaths. It is not difficult to imagine that the spinal fluid of these cases might well have reflected these organic changes, with findings similar to or even more marked than those in the present case. Further it was thought that the numerous violent cerebral episodes in this case immediately preceding the spinal fluid findings might easily explain them. Accordingly a tentative diagnosis of hyperinsulinism was made and an exploration of the pancreas decided on.

Operation.—On March 10, 1936, a laparotomy was performed, under general anæsthesia, by Dr. J. A. Gunn, and a small adenoma was found on the posterior surface of the pancreas near the tail. It measured one centimetre in diameter and was almost spherical. It was firm and encapsulated and weighed 0.553 grams. The cut surface was moist, bulging, and yellow with white bands. Microscopically it was an adenoma of the islets of Langerhans. (The pathological description is taken from the report of the pathologist, Dr. William A. Boyd.)

Progress of the case.—The patient made an uneventful recovery. There have been no further attacks and the blood sugar has not gone lower than 80 mg. per 100 c.c. on any examination. The basal metabolic rate dropped to minus 26 per cent four weeks after the operation and rose to minus 9 per cent on April 20th. The cerebrospinal fluid obtained six weeks after the operation showed a normal globulin content, 3 lymphocytes, and the mastic test showed a faint first zone reaction.

SUMMARY

1. A case of hyperinsulinism, associated with severe nervous manifestations, due to an adenoma of the pancreas, is presented.

2. An earlier diagnosis of a possible intracranial lesion is discussed because it emphasizes the frequent difficulties in diagnosis of the severe cases, and because of the misleading, though interesting findings, in the ventriculogram and cerebrospinal fluid.

3. Interesting basal metabolic rates are recorded.

4. Interesting cerebrospinal fluid findings are recorded, with suggestions as to their cause.

We wish to acknowledge our indebtedness to Dr. J. A. Gunn who performed the operation, to Dr. F. A. L. Mathewson who did the preliminary investigation in the case, and to Prof. A. T. Cameron, of the Department of Biochemistry.

REFERENCES

1. WAUCHOPE, G. M.: Hypoglycæmia, *Quart. J. Med.*, 1933, 2: 117.
2. WHIPPLE, A. O. AND FRANTZ, V. K.: Adenoma of islet cells with hyperinsulinism—a review, *Ann. Surg.*, 1935, 101: 1299.
3. HARRIS, S.: Hyperinsulinism and dysinsulinism, *Internat. Clin.*, 1932, Series 42, 1: 9.

A CASE OF TURPENTINE POISONING

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The following report of a death due to the injudicious use of turpentine in the treatment of an infant is presented in order to draw attention to the danger attending the internal use of this drug. The present-day therapeutic use of turpentine is practically limited to external medication such as stupes, various liniments, inhalations, and its common use is in enemata. From its ease of purchase and the instructions on the ready-printed label one may surmise that this drug is a common household remedy. As such, it is frequently given internally for threadworms and for a hundred and one other complaints not serious enough to require a physician's immediate attention.

The victim was a female infant, eleven months old. She was seen for the first time at home on December 24, 1934, and was sent to hospital at once. (Hôtel-Dieu Hospital No. K. 535). She was admitted at 3.15 p.m.

The history given by the mother was that the baby had had cramps on the night of December 23rd, and cried almost continually. On the morning of the 24th she had an emesis. "Baby's Own Tablets" were given but the infant continued to cry. At about 2.30 p.m. the child was unconscious and in a convulsion, so a doctor was called.

On admission to hospital the infant was in coma. Her eyes were glassy, rotated upwards and the pupils were dilated. There was marked cyanosis. The temperature was 107° (rectal); respiration was irregular and shallow, the rate varying between 80 and 100 per minute; the heart rate was between 250 and 300 per minute.

Alternate hot and cold baths were given for almost an hour before the cyanosis disappeared and breathing became more regular. Ten minims of adrenalin were injected during resuscitation. A soap suds enema returned clear, excepting for much mucus. Catheterization gave only one dram of urine. An ice cap was applied. The temperature at 4 p.m. was 103° (rectal). The cyanosis had disappeared and the general condition was slightly improved, but the pulse was thready and the respirations rapid. Consciousness was never regained and the infant died at 6.15 p.m.

Summary of post-mortem report.—The body was that of a well developed child. The skin was pale. No odour of chemicals came from the mouth. The thymus was large and there were numerous hæmorrhages, small and scattered. The heart showed some dilatation of the right side. The bronchi contained a considerable amount of muco-purulent exudate and the mucous membrane was congested. The stomach was distended with gas and on opening a definite smell of turpentine was obtained. There was little in the way of content; what there was was coffee-ground in appearance. The mucosa

was slightly congested. The intestines showed no abnormality. The mesenteric glands were enlarged and pink in colour. The lymphoid tissue at the lower end of the ileum was well developed. The kidneys and liver were pale; spleen enlarged and mottled. The bladder contained no urine. The brain showed congestion, but no other abnormality.

Conclusion: (1) turpentine poisoning; (2) acute bronchitis; (3) enlarged thymus; (4) general lymphoid hyperplasia.

On further questioning, the infant's grandmother revealed that she had given two teaspoonfuls of spirits of turpentine to the infant on the morning of December 24th. She thought that the child had worms.

Bruce and Dilling[1] give the dosage of spirits of turpentine by mouth as 2 to 10 minims, and the anthelmintic dose for an adult, 3 to 4 drams. They discuss the usage of turpentine internally as a carminative, hæmostatic and powerful anthelmintic for tapeworm. The drug is said to have a sedative effect on the cerebral and spinal centres. It is useless as an antidote in phosphorus poisoning. Cohen and Githens[2] state that turpentine is not very toxic; it takes 150 minims, in subcutaneous injection, to kill a rabbit; a dog will be killed by one ounce by mouth. The same writers claim that half an ounce is sufficient to kill a child of 14 months, although a child of the same age is said to have survived after taking four ounces by mouth. Adults have survived after one ounce, and even after three to four ounces, but in both instances there was coma for a long time. On the other hand intoxication has been reported from doses as small as 20 drops of a 0.1 per cent solution, repeated several times. Some people exhibit a decided idiosyncrasy toward turpentine. In these 30 minims will cause vomiting and diarrhœa. In larger doses there is an acute enteritis, vomiting of mucus, which is often bloody, diarrhœa, and passage of blood-stained mucus. Large doses have a marked effect on the kidneys, causing albuminuria, hæmaturia and even complete suppression.

A search of the available literature reveals little if anything definite on the subject of turpentine poisoning, and one is forced to conclude that the condition is rare and a fatal case even more so. As to treatment, it is that of any irritant poison, evacuation of the stomach and bowels, morphia for pain, and demulcent drinks. It is self-evident that the use of this drug as a household remedy should be checked.

REFERENCES

1. BRUCE, J. M. AND DILLING, W. J.: Materia Medica and Therapeutics, 12th ed., Cassell & Co., London, 1922, p. 854.
2. COHEN, S. AND GITHENS: Pharmacotherapeutics, Appleton, N.Y., 1928, 6: 854.

Clinical and Laboratory Notes

THE TYPES OF MYCOBACTERIUM TUBERCULOSIS PREVAILING IN MONTREAL*

(AN INTERIM REPORT)

BY N. W. MCLELLAN, M.D., C.M.,†

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This work was undertaken for the Shriner's Hospital for Crippled Children in Montreal, to determine the incidence of infection in man by the bovine type of *M. tuberculosis* in and about Montreal. The specimens were obtained mainly from the Shriner's Hospital and the Children's Memorial Hospital; occasional specimens were received from other Montreal institutions. The majority of the patients were children under fourteen years of age who lived in Montreal and its vicinity. A detailed classification of the cases will be made on completion of the investigation.

The procedure used in the isolation of the tubercle bacilli was the one in use in the laboratory. Both guinea-pigs and cultural methods were employed if the specimen was suitable; otherwise the material was either injected into animals or inoculated on media as circumstances indicated.

In cases which yielded tubercle bicilli a pure culture was obtained on Löwenstein's medium, with and without glycerine. The procedure used to determine the type of organism differed only from that used in previous investigations by Griffiths (1911-1928); Price (1932) and other workers in that inspissated serum, which has been used largely to provide organisms for animal inoculations and for seeding on media, was replaced by Löwenstein's medium. This, it seemed, gave a more rapid and copious growth and was more easily emulsified. It was rarely possible to use Löwenstein's media made with-

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† Henry J. Elliott Scholarship, Shriner's Hospital, Montreal.

out glycerine, as the organisms in the present series were strongly eugonic.

To determine whether the organisms were eugonic or dysgonic, the following media were employed, Dorset egg with and without glycerine, potato with and without glycerine, and inspissated serum with and without glycerine. Growth from a three to four weeks old culture on Löwenstein's medium was ground with a small quantity of broth to form a thick uniform suspension. One standard loopful was seeded on tubes of the various media. The tubes were incubated for six weeks or longer. The serum slopes were not very satisfactory, but the Dorset egg and the potato gave definite and clear-cut results. A strain was not said to be eugonic unless it gave a copious growth of numerous colonies on the glycerine Dorset egg and glycerine potato, and if the glycerine-free media yielded, at most, a light growth of fine colonies, or a very rare larger colony.

Rabbits were used in testing virulence. Organisms from a three to four weeks old culture on Löwenstein's medium were suspended in saline and injected. For each test one rabbit was given 1 c.c. of suspension containing 10 mg. of organisms (moist weight) subcutaneously, and another rabbit was given 1 c.c. containing 0.01 mg. intravenously by an ear vein. The animals were killed between six and seven weeks after inoculation. The criteria used in differentiating human and bovine forms were as follows. (1) *Survival.*—Animals living over six weeks were considered not to be infected with bovine tubercle bacilli, in all probability. (2) *Distribution.*—Absence of generalized tuberculosis was taken as evidence against the infection being bovine. The presence of lesions in the lungs on intravenous inoculation or of extension through the abdominal wall with peritoneal infection from a subcutaneous lesion was considered to be due to a human type of infection.

RESULTS

At the time of writing, specimens (totalling 75) have been received from 62 patients. No tubercle bacilli were isolated in 27 patients and in 8 others the presence or absence of tubercle bacilli is as yet not known. Tubercle bacilli have been isolated from 27 cases. In 12 of these the typing is complete; 5 have been typed by cultural methods only so far; and the examination of the remaining ten is not yet completed. The organisms that have been typed invariably proved eugonic on culture, and produced localized tuberculosis only in rabbits; that is, all the strains were the human type. In one case, both material from a hip and cerebrospinal fluid yielded human strains, and in another material from a psoas abscess yielded human type of bacilli on two different occasions. Of the 14 strains of human tubercle bacilli isolated, 6 were isolated from cases with bone and joint tuberculosis; 3 were isolated from cerebrospinal fluid; 3 from pleural exudates, 1 from the lung and 1 from cervical glands.

The series is far too small to enable one to draw any conclusions or to make any comparisons with work that has been previously done in other places, but it is hoped that a larger series will yield definite information. However, the absence of any indication of bovine type of infection in the series to date is interesting.

THERAPEUTIC USE OF HELIUM.—A. L. Barach states that because of the low density of helium, a respirable mixture of helium with oxygen requires considerably less effort to breathe than air or oxygen in patients suffering from obstructive dyspnœa. There were eighteen cases of severe asthma and twenty-one cases of obstruction in the upper air passages in this series. In status asthmaticus the treatment may result in the saving of life, five cases in the series seemingly being in this group; in severe, more or less continuous asthma, in an amelioration of the disease with recovery of complete sensitiveness to epinephrine in patients who previously had become refractory to it, as occurred in ten additional cases. In obstruction of the pulmonary airway from the bronchiole to the pharynx, inhalation of helium with oxygen lessens the respiratory effort and aids ventilation of the lungs, in some instances thereby averting tracheotomy; five patients in this series recovered without tracheotomy. In patient in whom the obstruction is below the trachea, dyspnœa may be relieved when tracheotomy itself would be unavailing. The usefulness of helium with oxygen in emphysema, associated with bronchiectasis or fibrosis or both, is compared to the procedure when oxygen treatment alone is employed. Smaller concentrations of oxygen may produce similar restoration of pulmonary function when helium is used as the diluent of oxygen instead of nitrogen. The clinical reaction to inhalation of helium with oxygen may be used as a diagnostic procedure to determine the presence or absence of obstruction in the pulmonary airway and associated pulmonary functions.—*J. Am. M. Ass.*, 1936, **107**: 1273.

Editorial

THE PURIFICATION OF INSULIN

EVER since insulin was discovered in 1922 there has been a steady effort to improve its action. Its initial use was attended by effects which seemed magical. Comatose patients were restored to life and vigour within a few hours and by repeated use of insulin their lives were prolonged. But very soon it began to be realized that insulin required much study in order to improve its efficiency. Patients required frequent and continual injections; insulin "wasters" were discovered; reactions were difficult to avoid in some instances, and so on. One of the main objects was to prolong its effect as much as possible, and this was approached in two ways; (*a*) by purification of the insulin, so as to heighten its effect, and (*b*) by the addition of some substance which would hold the insulin back, so to speak, and prevent its too ready absorption. As regards (*a*) a crystalline form was eventually produced which was as nearly pure as seemed possible, and the result was highly satisfactory, but only in some respects. So also with (*b*); protamine insulin was evolved, a combination of an amine with ordinary insulin, which spread out the action of the insulin into a slow steady effect.

But neither the crystalline form nor the protamine compound were efficient enough, and the apparently paradoxical explanation now given is that the purification of insulin has been carried too far. It has been shown by various investigators that the action of insulin could be heightened by the presence of certain metals; for example, by Maxwell and Bischoff, that basic ferric chloride gave an increased response to insulin in rabbits and rats. Further, it was known that crystalline insulin contained a certain proportion of zinc, but this was considered as an irreducible minimum of a foreign element which was known to be always present in the pancreas, and all efforts were directed to keeping it down. Workers in Toronto and Montreal, however, began to suspect this zinc element. Might it not be a factor in aiding the effect of insulin rather than a mere foreign element? The answer to their question is given in the paper by a group of workers at the Montreal General Hospital published in our September issue * and it is, in short, that the zinc found in the pancreas and always present to some extent in insulin plays a most essential part in its effects.

We would direct attention to this paper for more than one reason. First, it is an interesting example of what is continually happening in medical research, that is, the overlooking at first of apparently insignificant factors, only to be brought back to recognize them in the course of time and reflection.

The other point is that this advance in therapeutic knowledge has been brought to its full fruition by the efforts of trained research workers in two centres. Those in Toronto, the birthplace of insulin, worked in most happy cooperation with those in Montreal, whence such a steady stream of observations on diabetes has flowed during the last ten years or more.

H. E. M.

*RABINOWITCH, I. M., FOSTER, J. S., FOWLER, A. F., CORCORAN, A. C.: Clinical experiences with protamine-zinc-insulin and other mixtures of zinc and insulin in diabetes mellitus, *Canad. M. Ass. J.*, 1936, **35**: 239.

HYGIENE IN COLLEGES

IN a recent issue of the *Journal** we called attention editorially to the disturbing prevalence of tuberculosis among college students, taking as our text certain figures derived from colleges and universities in the United States. We also emphasized the necessity for instituting measures looking toward the early recognition of the disease and the prevention of its spread. While this subject has received some attention in Canada we must admit that the effort put forth to cope with it is far from adequate; to the south of the line they are much farther ahead.

The campaign for better health among students in the United States dates back some fourteen years, when the Presidents' Committee of Fifty on College Hygiene, an organization of college presidents and representatives, was set up in 1922 "to stimulate the development and extension of instruction and training in hygiene in normal schools, colleges, and universities". At that time it was evident that the higher educational institutions were not particularly interested in the matter. Then, in 1930, the American Student Health Association passed a resolution at its annual meeting calling for "the operation of a college program which should include instruction in and development of physical and mental health, the supervision of the care of individual student health and illness, the sanitation of student environment, and the study of health problems". Accordingly, the First National Conference on College Hygiene was held at Syracuse University, Syracuse, N.Y., in 1931. This gathering was sponsored by the Committee of Fifty on College Hygiene, the American Student Health Association, and the National Health Council, and its purpose was "to focus the attention of our most competent authorities upon the identification of the basic problems of college hygiene; secure their expert analysis of those problems; and then have them formulate a consequent statement of their conclusions". The term "college hygiene" was employed to include all the principles and practices that improve, maintain, defend and restore the health of the college student, and "health" was regarded as a composite state of physical, mental, and social health. The proceedings of this Conference have been published, and we are indebted to the Secretary of that body, Miss Louise Strachan, for a copy. It well repays study.

The National Conference on College Hygiene went into their task with characteristic American thoroughness. It is hard to point to any phase of their subject which was overlooked. Four Sections were established, —I, on Health Service; II, on Health Teaching; III, on the Organization and Correlation of the Factors in a College Hygiene Program, and IV, on Special Problems—each embracing a number of more specific sub-committees. The Section on Special Problems dealt with such matters as Social Hygiene, Mental Hygiene, Tuberculosis, Cancer, Health in Relation to Extra-curricular Activities, Nursing Problems, and Disaster Relief. It is quite impossible for us, in the available space, to consider this most comprehensive program at all adequately, but we may be permitted to set forth some of the conclusions at which the Conference arrived.

The principle was laid down that every college, regardless of size or resource, is under basic obligation, itself or through the parents of the students, or through appropriate community agencies, to arrange for the protection, maintenance and promotion of the health of its students, and for the detection, treatment and care of those of them who are physically or mentally sick or socially maladjusted. Then, the educational purposes of a college are not adequately served in the absence of suitable instruction on the subject of human health (in its widest sense) as applied to the individual, the family and society. It is a poor investment from every point of view if students of no intellectual promise and those whose health of body and mind, and personality are such that they are unlikely to be able to complete their college courses because of disablement or premature death. For these ends every college should institute the necessary medical examinations, give appropriate advice, and

* *Canad. M. Ass. J.*, 1936, **35**: 313.

provide treatment, if required, for the physical, mental and social ills of its students. It should instruct its students in the matter of their personal health and that of their families in relation to society. Student activities should be so ordered and controlled that these will help them to form wise mental, physical, and social health habits. All of which is excellent.

A second National Conference on College Hygiene is to be held in Washington from December 28th to 31st at which the progress made during the interval will be detailed. Canada has a link with this Conference in that Dr. A. S. Lamb, Director of Physical Training at McGill University, who has been a member of the American Student Health Association for some four or five years, has a seat on one of the committees. The findings of this Conference should interest us.

In this field of Student Health we have to admit that in Canada we have only scratched the surface. A Student's Health Service was instituted at Dalhousie University, Halifax, N.S., in 1931, which was placed under the direction of the late Dr. W. H. Hattie, Assistant Dean of the Medical School, who had worked out the details of organization. An attempt was made to give all the students a physical examination at the beginning of the academic session. The president of the University, Dr. Carleton Stanley, stated in his report for 1931-32 that during that period 855 students had been examined and that a large number of physical ailments had been detected. A total of 107 students out of the whole number were referred to specialists for further examination, as follows:—For the lungs, 28; for the heart, 21; for the eye, ear, nose and throat, 51; for other conditions, 7. Pulmonary tuberculosis was detected in 10 and healed pleurisy in 13. The President comments thus—"The large number of physical defects discovered in our students has been a startling revelation, which should serve to spur us on to greater effort in dealing with or preventing them."

At McGill University a group of students, a first academic year of medicals, we think, has been examined physically, has been tuberculin-tested and x-rayed, and has been followed up for four years. The results of this test are not yet available. All students must undergo a physical examination shortly after entrance, but this is not repeated except in the case of those who wish to indulge in athletics, in which case the examination is repeated every year. What the situation is in the other colleges of Canada we are not informed at the moment, but would welcome any information which they would see fit to impart to the *Journal*.

To carry out such a program as that visioned by the Conference to which we have referred requires a large staff of experts and a great expenditure of money. Probably it is beyond the means of most of our colleges at the present. Still, the work of the Conference has given us a lead and has set an ideal towards which all should strive. When we are told by competent authority that one-third of our college students would be unable to pass an examination for fitness for enlistment in the army—that is, that they are Class C or Class D in the matter of physical health, it is time that we do something more about it. We could start with the one problem of tuberculosis, deal with that fully, and, as funds permit, branch out into a wider program. The need is urgent.

A.G.N.

Editorial Comments

The International Commission on Anatomical Nomenclature

At the Fourth Federated International Congress of Anatomists held recently at Milan, Italy, an International Commission on Anatomical Nomenclature was appointed by the delegates of ten anatomical societies, representing the leading countries of the world, for the purpose of composing, with the cooperation of anatomists everywhere, a standard international nomenclature for gross human anatomy, to supersede the BNA and all other terminologies.

The present personnel of the Commission is as follows: Prof. T. B. Johnston, for the Anatomical Society of Great Britain and Ireland; Prof. C. M. Jackson, for the American Association of Anatomists; Prof. Hermann Stieve, for the Anatomische Gesellschaft; Prof. H. Rouvière, for the Association des Anatomists; Prof. J. Boecke, for the Société Anatomique Néerlandaise; Prof. V. Fontes, for the Société Anatomique Luso-

Hispano-Américaine, and Société Anatomique Portugaise; Prof. A. Pensa, for the Società Italiana di Anatomia; Prof. E. Loth, for the Société Polonaise D'Anatomie et de Zoologie; and Prof. G. Hirako, for the Japanische Anatomische Gesellschaft.

The Commission met immediately after its formation and agreed upon the following three points: (1) The Commission should be a permanent body for the purpose of revising the nomenclature from time to time as need arises, and there should be provision for needful changes of personnel in the future. (2) For the initial establishment of an international nomenclature the Nomina Anatomica (1936) of the Anatomische Gesellschaft, which has just been published, is to be taken as a working basis, and all changes are to be made from this as a starting point. (3) Suggestions for the new terminology are to be sent in each case to the representative on the Commission of the country or anatomical society concerned, who will forward them to the Chairman of the Commission, Prof. H. Stieve, of the University of Berlin. Thus, within the British Empire, Prof. T. B. Johnston of the University of London, will receive the suggestions. All such material should be in the hands of Professor Stieve not later than September 1, 1937. He will then refer them to the Commission, and from all the suggestions the Commission will construct the new nomenclature upon the basis aforementioned. There will be a great deal of work connected with this revision, but it is hoped that the new Terminology will be in final shape in 1939. The basic terms will be in the Latin, but these are easily convertible into the vernacular of each of the countries interested. Indeed it is anticipated that, as soon as the Latin basis has been laid, representatives of the English-speaking countries will convene for the purpose of establishing a uniform set of English equivalents. This consummation will be of immense advantage, not only to writers and publishers of text-books but to all those engaged in the teaching and practice of medicine, as well as to those in general mammalian biological work.

CHARLES C. MACKLIN

The Late Lord Moynihan

We regret to have to record the sudden and unexpected death of Lord Moynihan of Leeds, who passed away at his home on September 7th at the age of seventy.

Lord Moynihan was well known in Canada. He attended the combined Meeting of the British and Canadian Medical Associations held in Winnipeg in 1930. On that occasion he delivered the Listerian Oration of the Canadian Association, and those who heard his effort well remember his eloquent and touching eulogy of the great surgeon. In September of the same year Lord Moynihan received the honorary degree of Doctor of Laws from McGill University. In presenting him for this honour Professor Archibald used these words which epitomize his work and character.—"His name is honoured throughout the medical world and he is known not only for his skill in the handicraft of surgery but also for most important contributions to the advance of its sciences. He is the author of numerous articles and treatises upon the art and science of surgery, and also of many essays and addresses of more general interest, all of which are noted not only for the excellence of their matter but also for grace of diction. He has worked unceasingly for the establishment of the highest standards of the profession of medicine, and he is known not less for his devotion to the interests of the sick man than as a great physician and a great citizen."

Berkeley George Andrew Moynihan was born in Malta on October 2, 1865, the son of Captain Moynihan, V.C., of the 8th Foot (The King's Regiment). He went to the Royal Naval School and took his medical training in Leeds and Berlin. He qualified in 1887 as M.B., B.S. (Lond.) and the diploma of the Royal Colleges. He became F.R.C.S. in 1890 and M.S.(Lond.) in 1893 (Gold Medal). Beginning his medical career as a resident in the Leeds General Infirmary he was appointed to its honorary surgical staff in 1896, and eventually became Professor of Surgery in the University of Leeds. He was knighted in 1912; made a C.B. in 1917; a K.C.M.G. in 1918; a baronet in 1922; and a baron in 1929. From 1926 to 1932 he was president of the Royal College of Surgeons of England. He served with distinction in the Great War, being mentioned in despatches, and held the rank of Hon. Major-General.

In 1920 Sir Berkeley Moynihan (as he was then) gave the first Murphy Memorial Oration before the American College of Surgeons, which in that year convened in Montreal. On this occasion he, in association with Sir William Taylor, of Dublin, and Mr. Albert Carless, presented a ceremonial mace to the American College of Surgeons on behalf of the consulting surgeons of the British Armies, "in memory of mutual work and good fellowship in the Great War, 1914-1918".

Among the many works which Lord Moynihan produced special mention may be made of the following: "Abdominal Operations", "Gallstones and their Surgical Treatment". "Duodenal Ulcer", "The Pathology of the Living", "The Spleen and its Diseases", and "Diseases of the Pancreas". Moynihan was one of the first, if not the first, to use the term, now so well accepted, "hunger pain". Two institutions were near to Moynihan's heart—the Association of Surgeons and *The British Journal of Surgery*, both of which he was instrumental in founding.

More recently (1935) he became president of the Voluntary Euthanasia Legalization Society.

Many honours came to Lord Moynihan. He was an Honorary Freeman of Leeds; an Hon. Fellow of the American Surgical Association; member of the French Academy of Medicine; honorary president of the 19th French Congress of Surgery; Hon. Fellow of the Medical Society of Bologna, of Poland, of Serbia and of the Academies of Medicine of New York and of Cleveland; Fellow of the American College of Surgeons; Honorary LL.D. of Leeds, Edinburgh, Bristol, St. Andrews, McGill, and Toronto; Fellow of the Royal Geographical Society; Fellow of the Society of Antiquaries; Fellow of the Zoological Society, and a Knight of Justice of the Order of St. John of Jerusalem.

In 1932 he was Romanes Lecturer at Oxford University and the following year was Walker Lecturer at St. Andrews University.

Lord Moynihan was a trenchant speaker and singularly felicitous in the use of words. Dr. Archibald, who was, this year, Moynihan's successor as Listerian Orator, characterizes him aptly as "master of the *mot juste* and the striking phrase". His influence as a scientifically-minded surgeon and an original teacher will live for long. A.G.N.

The Abuse of Blood Pressure Readings

When we urge people to take an interest in their health we start something that is capable of distortion. Normal, healthy human beings should not have to think of their health beyond the dictates of common sense, in which we include the simple knowledge so freely broadcast nowadays by every trustworthy channel of information. There are those, however, whose interest in their health is easily raised to a morbid degree, and full advantage of this tendency is being taken in recent months by the exploitation at places of public entertainment of blood pressure instruments by men whose only desire is to collect cash. For ten cents they will take a reading of the systolic blood pressure, and let the inquirer see it for himself. What the reading means is not disclosed; the curious are referred to their medical attendants. So that it might be urged that no great harm is done. But apart from the fact that a single reading of the systolic pressure is an extremely exiguous piece of evidence, it is quite possible that the knowledge of a supposedly high pressure, graphically climbing on a dial before his eyes might easily start undesirable reflections in a morbidly inclined mind.

The matter has been further brought to our attention by one of the large blood-pressure instrument manufacturers, the W. A. Baum Company. This company has very sensibly tried to discountenance this questionable form of public amusement by refusing to sell its apparatus to these "medicine men". It has been suggested, with some reason perhaps, that unless some active measures are taken to check them, this exploitation of diagnostic tests by charlatans may increase to serious proportions. It is probable, of course, that at public fairs there will always be some mild form of test or examination which makes money out of curiosity regarding health. Even the weighing machines come into this category, or those tests of strength by which a mallet blow raises a weight over a graduated scale. But such a variable and obscure factor as blood pressure calls for a little more respect and judgment. H.E.M.

Good Work by the Canadian Red Cross

We have before us an attractive booklet, entitled School Health, Vol. I., which is the first of a series being issued by the Canadian Red Cross Society. This particular excursion into the health field is commendable. In the Foreword, by Dr. G. G. Nasmith, the chairman of the National Junior Red Cross Committee, the first sentence is an arresting one—"Last year 10,299 Canadian teachers organized Branches of the Junior Red Cross in their classrooms". Teachers, then, constitute by far the largest group of voluntary Red Cross workers in Canada. This showing is worthy of all praise. It means that a large body of trained men and women are acting as apostles of health in those quarters where information on health matters is most likely to do good.

In times of war dire need makes it possible to regiment large numbers of persons so that they will carry out health practices to the letter. Not so in times of peace. We can only go so far in enforcing public health measures by the exercise of law; results depend upon the intelligence and cooperation of individuals and of the masses. In short, "we can lead a horse to the water, but we cannot make him drink". But, there is a remedy. Dr. Nasmith well remarks—"It is most difficult to develop a 'Health Conscience' in adults, but easy in children; and it is easy to develop good health habits in children because a child is receptive and willing to believe". The booklet and its successors are intended for teachers, to give them helpful information on health topics, so that they will the better be able to instruct their pupils. The scheme is admirable.

A.G.N.

Special Articles

THE RELATIONSHIP BETWEEN GENERAL MEDICINE AND PSYCHIATRY*

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In general medicine and psychiatry we are dealing with a poorly functioning complex organization of integrated cell systems. Because of this complexity the study of the disorders of this biological entity—the human being—has, for purely practical purposes, due mainly to the shortness of one's lifetime, been arbitrarily divided piecemeal into its several parts, namely, into the study of the circulation, the respiration, the digestion, the reproductive apparatus, the nervous system, the mind, the skin, and so on. The common denominator of all these fractions is an interest in living things which are ill. On what common ground can we discuss the subject with all of them? Obviously, we must all throw away our specialism, all preconceived notions, and become, not psychiatrists, cardiologists, neurologists, etc., but unfettered observers of living processes. We must begin with something very simple. I propose to use as an example the amœba—a unit of living material always a favourite object of study for protoplasmic physiology—and to review its functions, never jumping ahead, but proceeding by logical steps which seem to be at that moment true. The amœba, being alive, must have all the functions of life to keep it so, and these functions are obviously in a most primitive and simple form and suitable to our purpose as observers of biological phenomena, ignorant but highly intelligent thinkers.

What are these functions? 1st: The amœba is irritable, that is, it reacts to stimuli. 2nd: It respires, that is, it absorbs O_2 and puts out CO_2. 3rd: It digests food. 4th: It excretes waste products. 5th: It changes its shape. 6th: It reproduces itself. 7th: It exhibits behaviour phenomena which on the whole are such as we should expect of an organism working by "trial and error", that is to say, it behaves as if it had purpose or exhibited the phenomenon of "choice". One of the observers studying amœba behaviour sums up the operations of an amœba ingesting a round encysted Euglena in this way: "One seems to see that the amœba is *trying* to obtain this cyst for food; that it shows remarkable pertinacity in continuing its attempts (to put forth efforts) to accomplish this in various ways; and that it shows extraordinary perseverance in continuing its attempts to ingest the food when it meets with difficulties. Indeed the scene could be described in a much more vivid and interesting way by the use of terms still more anthropomorphic in tendency." Now this latter behaviour may represent the primitive "mind".

Now here you have seven functions of a living unit produced from a previous unit and occupying a cycle of time from the moment when it is produced (born), grows, has an experience in a certain environment, deteriorates and dies.

What is the relative value of these functions? Is there any one, or any two, which one can reasonably say is a *higher* function, either in its elaborateness or in its superiority? Personally, I think not. There is none that it could do without. On first glance one might pick on the function of "choice or purpose" as being superior, but this I think is because we rationalize it in terms of human beings, in which it is the custom to regard our elaborated mind as a luxury, a superadded spirit-like function in contradistinction to the material animal-like function of say, digestion. Since the higher animal, man, began, digestion, respiration, etc., have remained where they were, or possibly have retrogressed, but mind function from its very nature of experimentation has flourished and blossomed out. It is this disproportionate evolution which has been the cause of many difficulties in medicine. The showiness of mind function has stealthily divorced it from its proper position in the midst of its brother functions in the original forms of living things. That is why I have gone back to the primitive form of life where all the physiological functions are on the same level of importance and we are viewing them in equal perspective.

Thinking then only of the amœba and these functions, we can now ask what the factors are which will influence the excellence of the work done by them. *First:* The quality of the material from which it has been made. Obviously, if its parent amœba or its ancestral amœbæ have for various reasons and in various particulars undergone a deterioration in quality, then the offspring will tend to be degenerate in one or more particulars, these being—irritability; respiration; digestion; change of shape; reproduction; behaviour. So after a few hundred or million of generations of amœbæ, an amœba might be produced whose quality in some particular or as a whole would not be as "normal" as the original amœbæ were. *Secondly:* The supplies of material for growth, maintenance and repair necessary for its own particular chemical and physical requirements must be *perfect* in

*Adapted from a paper read at the weekly seminar, Toronto Psychiatric Hospital, April 7, 1934.

quality, *quantity*, and *constancy*. It must have ordinary stimuli, a constant supply of O_2 and proper food. The *third* factor on which the excellence of function depends is that the supporting medium in which it is living must be correct. In the case of the amœba it has to be watery and of a certain composition; a salt water amœba put in fresh water will die. *Fourthly:* The temperature of the medium must be correct. *Fifthly:* The presence of stimuli for the exercise of its functions. This idea needs some elaboration. In the illustration, the quotation describing the behaviour of an amœba in its attempts at ingesting an encysted Euglena, difficulties were mentioned which the amœba overcame. This was exercise for its faculty of purpose or choice that is its mind function. It is quite conceivable that if no problems were presented this function would become faulty, and the amœba would die. If all these factors are ideal then the work or functioning of that cell should be perfectly done, that is, it would have normal health. Keeping this point in mind, what has happened in the evolution of living things that have become complicated arrangements of myriads of these units? Not only have they become elaborated because of the numbers, but much more, of course, because of the necessary specialization of function. For example, the cells which by the mere reason of their distance from the surface have become deprived of their source of supply of oxygen have to have some arrangement made for a method of carrying O_2 to them, and so, skipping a few hundreds of thousands of years, we find a certain group of these same primitive units specializing, for example, in the absorption, transmission and delivery of O_2. But with this cultivation of excellence they themselves become dependent on other groups of primitive units for the performance of those other functions which of necessity they have had to abandon to a large extent in *learning* to become peerless in a particular function. Thus the muscle cell, for example, has concentrated on the perfection of the stretching and shortening faculty, (the changing in shape function of the amœba), while the remaining functions have not been developed further and are stationary in the primitive stage. So that the muscle cell digests only the simplest foods ready for use; it cannot exhibit any choice or purpose, and manœuvre to overcome difficulties in getting food. Its respiration is primitive. It reproduces by simple division, and it is irritable to certain stimuli, *and*, let me emphasize here, if those stimuli fail it atrophies and loses that function in which it had excelled. That is what I meant by the fifth factor for health, namely, the presence of stimuli necessary for normality. In the same way the system of cells excelling in digestion can cope with complex foods. By this course of reasoning, in the biological organization, man, we find that the various functions are carried on by the various cell systems,—the respiratory, cardiovascular, urinary, gastrointestinal, skeletal and locomotor, and nervous. My object in detailing these elementary principles is to get all these functions on an equal footing. And this is all for the sake of that one function in which you are interested, namely, the "mind" function.

One feels fairly safe in saying that these cells or system of cells which specialize in the function of mind are part of the higher nervous system. I am not speaking anatomically when I say "higher", but in the sense of higher specialization. Then when these new biological entities are evolved they are made up of congregations and masses of these units, split up only by their specialization in function. This complexity necessitates a political economy. This means that essential principle of the harmonious cooperation between all the elements of this commonwealth of cell systems, each group having lost most of the original faculties present in its biological ancestor (namely the amœba), in developing its perfection of one function.

In studying the diseases of this entity, man, this principle of harmonious cooperation is of fundamental importance, and many of the clinical syndromes of ill health are due to a discordancy in this harmonious balancing between cell-system functioning. A change or an upset in one will necessitate an adjustment all round. The number of permutations and combinations of these causes and effects is infinite, and, depending on the factors enumerated above, the ringing of the changes will be as different, excessive, or abnormal, as there are individuals, because the environmental influences can never be the same for two different individuals.

For the purpose of *studying* psychiatry, and in the discussion of the relationship of general medicine to it, we must get this fact firmly fixed in our mind, namely, that the mind function is essentially and truly on a par with the digestive function, the respiratory function, the locomotor function and so on, and that changes in one cause effects in the others. Now we recognize the existence of a system of cells by the facts of their functioning. That is to say, the functions are specific and it will respond to injury only by alterations of its specific function; a muscle cell alters in its ability, to become shorter or to stretch; a bone cell alters in its ability to withstand stress and strain, and bends or fractures; a liver cell in its ability to extract bilirubin from the blood and to store sugar, etc., with the resultant varieties of hepatic insufficiency, such as jaundice, cholæmia, etc. A nerve cell alters in its ability to initiate, receive and transmit stimuli, the quality of these stimuli depending on the kind of nerve cell, and when they misfunction the alteration is in the quality of the initiation, reception, and transmission of those stimuli, and in no other way do they show their fault.

The gist of all this is that particular signs and symptoms are specific for a particular tissue cell. The symptoms and signs of tissue function account for the picture of ill health, and the interpretation and analysis of those signs and symptoms is the foundation of medical science. Because of the cooperation of the various systems the results of failure or misfunction of one may be widespread and the secondary effects hard to disentangle. The failure of heart muscle cells produces the signs of heart failure, in the first place the general effects of a deficient pumping action, and, secondly, the effects on the respiratory function, liver function, gastro-intestinal function, etc. I am labouring this point for what I think is a good reason. Cardiac failure alters the functions of all other tissues; that is they cannot behave normally; also it changes the behaviour of the individual as a whole; he cannot walk; his capacity for using his body becomes decreased; he has to lie in bed, that is, his locomotory system becomes functionally limited; he cannot read as well; not only may his eyesight become easily fatigued but his power of concentration wanes, he cannot use his mind as well. If his cardiac muscle cell failure is severe enough he cannot use his mind cells any better than he can use his liver cells, and he not only has jaundice, but he becomes delirious, disoriented in all spheres. The stimuli of the environment that previously affected his mind no longer work. Supposing, like a psychiatrist, one described a well-known illness in terms of symptoms. It would be like this. One day a certain man did not feel hungry for breakfast. Though feeling indefinably not quite up to it, he went down to business as usual, rather wishing he could stay at home. While working at his desk, an overpowering weakness fell over him like a cloak; he was cold, shivered violently and found himself unable to continue giving to his stenographer the details of a business project in which, up till that moment, his interest was keen. His will power to continue that interest forsook him entirely, though he noted that the actual physical discomfort did not seem adequate to explain this moral weakness. Walking became difficult and a new symptom occurred, namely, a surprisingly sharp pain in his left chest which cut his breathing function to less than half. After being carried to bed, he exhibited rapid breathing, more muscular weakness, and the temperature of the body rose to high levels. The reflex of coughing was stimulated; the colour of the body changed, first to red and then to a bluish-red tinge; the rate of the heart increased to more than double normal. After an hour or two the coughing reflex brought up brownish blood. There was a look of anxiety on the man's face and he continued not to want to walk, talk, or eat. In fact, his stomach by reverse peristalsis ejected its contents. The amount of urine was scantier than usual. Gradually his silence ended by the pronouncement of unusual sentences, unusual remarks which no one had heard from his lips before. He seemed to be talking to people who were not there. He caught glimpses of objects which no one else could see. His pet business project was recounted in a most absurd way. His subjective sensations were a new experience. Everything material took on a curious personality, the walls, looking extraordinarily solid and, though almost alive, were motionless. He found that he had never realized a "wall" before. How definitely it stood there to keep you in! At times he felt it was definitely advancing on him, and yet the distance did not lessen, and the people around who were inclined to stare, took no notice of this curious change in the character of walls. Voices and the sounds of footsteps and cups on the table were curiously blanketed, and yet close by. There was a feeling of a speeding-up of the hum of the world, but events seemed less frequent. The sheets on the bed felt like ice, but without any coldness, and this kept altering suddenly. His mind felt as if it were racing, and he found that it was possible to stand to one side and watch the memories rush by. It was comfortable to do this, but the pain down there on the left kept interrupting.

Now what is this disease? A psychiatrically trained observer, to stick to his method, would say:—"This man has a locomotory—respiratory —cardiovascular — gastrointestinal — urinary —psychic disorder, and it seems to be a toxic condition. These systems are all behaving in abnormal fashion, and this combination of events is called "lobar pneumonia". Now in this description we see the misbehaviour of all systems of cells on an equal plane. His psychic symptoms can surely only mean that there has been injury to those particular cells which deal in "mind things"—the conception and association of ideas—the sense of time, place and person, memory, reasoning, emotion, etc., and these cells show their malfunction by the disorder of behaviour in the whole individual, exactly as the failure of heart muscle cells alters the behaviour of the individual in the realm of locomotion, so that he *has* to lie down instead of walking about; because it is one of the normal functions of the heart to keep one enabled to walk about. To return to the first clinical picture, that of the patient with such severe disturbance of blood flow from heart failure that his mind functions were disorganized, or to the second picture of the patient with pneumonia; supposing one began the description with the mental symptoms and then said "But this patient was not in bed—there was nothing wrong with his heart, lungs, etc.—in fact he has no organic disease that we can find". Then the psychiatrists might say:—"The cause is psychogenic—a toxic psychosis—a manic-depressive psychosis—an hysterical reaction—a psychoneurotic-neurasthenic reaction, etc."—

and they would be right, because they are describing only the symptoms of the disease and not the cause of it, not the actual lesion.

If my argument seems logical then we can only conclude that all mental disease is organic. We can recite examples of heart diseases, lung diseases, and so on, in combination with psychological upsets of all degrees and kinds. Practically every organic tissue lesion is accompanied by a change in the psychic state of the individual, not at all as an effect, but as a part of it. Some of these changes may be profound. Many of them come within the limits of what we call average behaviour under such circumstances. From familiarity we are accustomed to place these mental symptoms among the well known characteristics of some particular disease, *e.g.*, the delirium in pneumonia (or any other acute infection), the euphoria in general paresis, and the feeling of fear in angina pectoris. (Sometimes an attack of angina has the fear and no pain.) Now this delirium, this euphoria, and this fear are no different in kind from those very same symptoms in psychotic patients having periods of delirious, manic and anxiety states without any obvious cause or basis discoverable. The great stumbling block to an unprejudiced discussion on the subject of organic mind is the view and feeling that "thoughts", "ideas", "wishes", "emotions", "instincts", etc., are sacred, holy, supernatural, not flesh and blood things; the term "psychic sphere" still smacks of "æthereal nothingness". It is difficult to be coldly scientific all the time, but I do not believe that the function of mind is on any different plane for the purposes of scientific study from that of liver cells or of the spinal cord cells, and you can no more initiate an "idea" from a reticulo-endothelial cell that you can manufacture bilirubin in a psychic cell.

In the growth of the individual from birth, infancy, through childhood, etc., to old age, each kind of tissue is affected by factors of the environment, and psychic tissue is affected by psychic materials which reach it by way of the special senses. They may be salutary or the reverse,—what one might call "psychotoxic" materials doing injury of a definite organic chemical physical kind, quite immeasurable by our present methods of examination, and not necessarily accompanied by structural changes. This is quite comparable to those cases of patients dying of heart failure in whom no abnormality can be demonstrated (as yet) in the heart muscle, and in diabetics dying in diabetic coma, where nothing unusual is to be found in the structure of their pancreas. And yet they die from the secondary effects (one of which is unconsciousness) of a severe functional disorder (*cf.* the acute manic deaths?).

Returning to the consideration of the influence of the factors of environment from birth onwards, we realize psychotoxic factors are most impressive during the growing, learning period; that they will have a permanent effect. However, other tissues during that time are undergoing the same process. For instance, the absence of a certain vitamin from the food results in rickets, producing permanent changes in the bone-tissue, and you recognize these by the altered shape and behaviour of parts of the individual; his conformation is altered; he looks different and possibly "queer". Another instance is in the development of the general immunity mechanism of the individual. He is subjected to doses of bacteria, which inoculation produces a reaction on that part of his cellular organization which has the capability of learning how to deal with future attacks of these other living things which might endanger his life. If this reaction is severe he is said to be "ill", merely because it affects the behaviour of certain of his tissues or all of them in a peculiar way. By our ingenuity we have invented vaccination and inoculation with small doses of these ordinarily harmful agents in order to produce this education without its dangers. In some individuals the lesson is not learned for long, and the process has to be repeated in a few months or years. This is part of what is called preventive medicine. Now on a par with this is the effect of psychic materials which can be otherwise named under the broadest meaning of the words "suggestion" and "example". Thus, if a child has a good home environment his parents and other relations will provide psychic substances which will so educate his mind cells that in the future (near or far-distant) he will be able to deal with psychic problems without a reaction in that particular tissue severe enough for him to be called *mentally* ill. This is what is called mental hygiene. Our ingenuity in this regard is still rather mediæval. If the training is by a drunken father or a foolish mother with poor judgment these materials will be psychotoxic. Now we treat both these illnesses with the equivalent materials. We use the kind of materials which will be effective on the tissue we wish to change the behaviour of. I can illustrate it by saying that if a patient is ill with diphtheria/hysteria you give him a large dose of antitoxin/suggestion and he is cured, but you must use the right antitoxin/suggestion. The antitoxin/suggestion is obtained from another biological organization, the horse/psychiatrist whose similar tissue anti-body producing cells/mind cells have been specially trained and understands this disorder by previous inoculation/by learning. As a matter of fact, we could use the more highly specialized organization—the psychiatrist—for both!

Having got the mind on an equal, but not superior, footing with the other tissues of the body, we conclude that the relationship existing between psychiatry and general medicine is that of identical twins. This is the reason that just as every physician who studies and treats ill people is at once confronted with the study of normal and abnormal psychological states, so every psychiatrist who studies and treats

mental ill-health is immediately and constantly concerned in general medical problems.

Progress in medical science is made more rapid by special investigations in heart disease, respiratory, gastrointestinal, metabolic, mental disease, etc. The specialists studying in these restricted fields are the greatest asset of our modern medical organization. Of course we all know the danger in it, namely, that the specialist so near to one aspect of the problem of disease, and having this part so well in focus, fails to view the many parts in their true relative perspective, and thus has his broad-sight blurred. To avoid the possibility of this distortion it is wise for him occasionally to review the whole field panoramically.

As listed before, the excellence of cell or tissue function depends on various factors: factors which have played, and are playing, a part in the foundation, construction, and development of this cellular personality

1. The quality of the ancestral material (the heritage) —This is demonstrated by family peculiarities, peculiarities of physical features, and constitutional items of all sorts, the personality scenery that obtains. As you recognize the part of the country you are in by the fauna and flora of the district, the character of the soil and the geological formation, so in an individual or a group of individuals, you can recognize the family and ancestral traits both of habits of mind and habits of body structure and function. You will be aware of certain defections or of certain superior qualities. Some of these hereditary qualities are easily recognized. For instance, there are the so-called endocrine types, the very fat, the very thin, the very tall, and the very short people. If these peculiarities are beyond a certain range (which we call the average normal range) and interfere with their behaviour, or if these variations in function, because of the harmonious co-operation which exists, upset the function of other tissues, the individual is said to be "ill." Then there are a number of tendencies, peculiarities, weaknesses or abnormalities which do not appear until the curtain goes up for "illness". In the foreground of the stage are the symptoms of the present moment—the present illness—but by a careful history we see that in reality the stage has already been set.

Some of the more common abnormalities of the family material are: the early vascular deterioration that is found to occur; the premature ageing of the intervertebral discs; the family defect of pernicious anæmia; the migraine families; the asthma, hay fever and allergic families; the duodenal ulcer family tendencies. Then there is that large group of the *abiotrophies*, *e.g.*, cerebellar ataxia and Huntingdon's chorea. In this group there is a progressive deterioration of certain tracts or portion of the central nervous system appearing early in life and often occurring earlier in life in succeeding generations. In normal old age all tissues deteriorate more or less synchronously, and a symptomatic cerebellar ataxia occurs normally in old people, as does vascular deterioration and degeneration of the intervertebral discs. But in the abiotrophies the cycle of life of a certain part of a tissue is short even under a favourable environment and even shorter in an unfavourable one.

2. The quality of supplies for growing, maintenance and repair —All tissues obtain supplies by way of the blood stream. The nervous tissue in addition receives supplies from the special senses and stimuli from the peripheral nerve endings having to do with posture, appreciation of weights, and the qualities of space. The special senses are the pathway for those materials necessary for the growth, maintenance and repair of psychic tissue, and so may be salutary or psychotoxic. The blood stream going to those cells may also contain toxic materials which have been derived from a distant infective focus. The degree of toxicity may vary from the intense pneumococcic toxin, tetanus or diphtheria toxin, to the weak toxin from an infection of the skin or a chronic dental abscess. The injurious effect of a toxin is dependent also on the length of time of its action, so that a weak toxin acting for a long period of time may do as much damage as a strong toxin acting for a short time, though perhaps with different results, because the lapse of time enables some adjustment to be made on the part of the tissue to cope with it, to make some effort at a defence mechanism, and to attempt repair processes. Now these adjustments, defences, and repairs, are unfortunately often a mixed blessing because they frequently interfere with the normal functioning of the cells. Scar tissue is a gross example of this state of affairs. It is all very well for a duodenal ulcer to heal itself by scar formation, but if, in the process, it obstructs the duodenum so that no food can pass, it is too much of a good thing. In the psychic tissue an hysterical reaction may shield the individual from an unpleasant fact or experience, but it is hardly a successful or enduring defence, except that in a roundabout way he may be treated by a psychiatrist who can teach his psychic tissue to combat psychotoxic materials in a less exaggerated way, as the general physician can sometimes treat a duodenal ulcer without the production of so much scarring. Infections are not the only source of toxins in the blood stream. An excess or abnormal product of the endocrine glands is tissue-toxic, as for example in hyperthyroidism, acromegaly and basophilism, and also in the histamine production in the skin in sun burns, the intoxication from the products of wholesale protein destruction in fire burns, and from the rapid growth of malignant cells. Then there are mineral poisons such as the heavy metals, arsenic, mercury, lead, etc., and the substances called drugs. And, of course, the blood supply may contain bacteria.

The quantity of the necessary supplies must be adequate.—The blood stream must contain suitable food materials ready for use. There may be a lack of sufficient oxygen which might be due to an anæmia. The necessary vitamins may be diminished or absent (as in pellagra, beriberi). The salt of the plasma may be deficient. The quantity or endocrine hormones may be insufficient as in atrophy of the pituitary (Simmond's disease) or in parathyroid tetany, or after castration, or in Addison's disease or myxœdema (or cretinism). In the psychic tissue partial starvation may occur in the deaf, dumb, and blind, or in normal subjects from lack of facilities for training and education. *The supplies must be constant.*—Interruption in blood flow to a tissue may occur in arteriosclerosis or short interruption by spasm as in migraine, and in other disturbances of the autonomic nervous system. This results in starvation of varying degrees from mild to complete, and the tissue either deteriorates or dies. Similarly, psychic substances must be constant and partial starvation results in deterioration.

The temperature of the tissue must be within "normal" limits.—Thus in "heat stroke", "fever", and "freezing", the limits of temperature are exceeded, producing abnormal functioning of every tissue. *The medium or supporting fabric* must be correct and not interfered with. The application of excessive physical force, the formation of scar tissue, the presence of foreign substances, tumour formation, or œdematous fluid will interfere with tissue function. *Behaviour stimuli.*—If no call is made on a tissue for work it will atrophy in spite of otherwise perfect conditions as regards nourishment and so on. Certain tissues atrophy after their nerve supply has been cut off. Psychic tissue requires "education", "learning", "responsibility" (mental hygiene).

It is only by thinking in this way that in a psychiatric case one attempts to estimate the factors on which psychic tissue depends for its health. The question of its blood supply and all that it contains is of great consequence. By this point of view we can see how an infected tooth, or a damaged heart, or an anæmia, or a food deficiency, or an endocrine disturbance, or arteriosclerosis, are important psychically. Similarly, in a general medical problem the operations of the psyche affect all other tissues individually and collectively, directly and indirectly. It is perhaps opportune here to mention the truth that an observer who studies these complex problems inevitably studies himself too.

In summing up, therefore, the situation in a given case from the facts of the history and those found by physical and laboratory examinations, one can discuss in a contemplative fashion what appears to be the reason for such a course of events. On the qualities and characteristics of the material from which that individual was made the factors of environment play with varying strength and relative proportion, so that the patient you are confronted with today is a biological resultant up to that instant of a host of unceasing forces in which the laws of probability have played a large part, and of a maze of conditioned reflex actions, the simultaneity and interwoven intricacies of which we can never hope to comprehend in detail but merely in principle.

The argument is that all mental phenomena, normal or abnormal, in sickness and in health, are organic, represented surely by concrete chemical and physical states in particular cells of the brain (most probably); that changes in that chemical state need be extraordinarily slight to alter greatly the mental phenomena observable subjectively or objectively. Also, the range of this sort of chemical reaction is so great that, while enough may occur to produce the wildest abnormality in mental behaviour, it may not be enough to be detectable by any biochemical or pathological technique yet devised. And even then there might be a vast amount of chemical change before any structural alteration was produced in those cells. The recognition of a change short of this alteration in structure can scarcely be expected by our present methods of investigation, especially when those cells are dead.

CHRONIC ENDEMIC DENTAL FLUOROSIS (MOTTLED ENAMEL).—According to H. T. Dean the endemic hypoplasia of the permanent teeth known as chronic endemic dental fluorosis, or mottled enamel, is a water-borne disease asssociated with the ingestion of toxic amounts of fluorides in the water used for cooking and drinking during the period of calcification of the affected teeth. The permanent teeth in particular are affected, although in areas of medium to marked severity the signs of mottled enamel are at times observable on certain of the deciduous teeth. Among those children exposed to waters containing relatively high amounts of toxic fluorides during the first eight years of life, an incidence of from 80 to 90 per cent is not uncommonly observed. In some instances it may reach 100 per cent. Both the incidence and the percentage distribution of severity of the condition has been found to vary in relation to the fluoride concentration of the water. In the light of present knowledge, this disease is readily preventable. The logical approach to the solution of this problem is, of course, avoiding the use of water containing fluorides in excess of the permissible limit. In some instances this can be accomplished by simply changing to a readily available source in the same neighbourhood that is free of toxic amounts of fluorides. Where such changes are not entirely feasible, it may be possible in some cases, especially where the water contains less than 2 parts per million, to dilute an otherwise satisfactory water supply with another water that will bring the final fluoride content down within the permissible limits. And while these changes are being made, it is well to bear in mind that the only portion of the population known to need protection is the group of children between birth and 8 years of age, inclusive. *J. Am. M. Ass.*, 1936, **107**: 1269.

Association Notes

The Canadian Medical Association—Alberta Division

The first annual meeting of the Canadian Medical Association, Alberta Division, which would have been the thirty-first annual meeting of the Alberta Medical Association had it continued to exist, was held at the Palliser Hotel, Calgary, on September 15, 16 and 17, 1936. For the second year in succession Dr. D. S. Macnab, of Calgary, presided. There was a very good attendance considering the existing conditions in many of the rural parts of the Province.

The first day was devoted chiefly to the business of our Association. Of first importance was the adoption of a new constitution, concerned with the merging of our Association in 1935, with the Canadian Medical Association. According to the new constitution, a plebiscite will have to be taken to ratify this merger.

The representatives of the Canadian Medical Association at our meeting were Dr. Herman M. Robertson, President, and Dr. T. C. Routley, General Secretary of the Canadian Medical Association, Dr. Trevor Owen, of Toronto, and Drs. Ross Mitchell and P. H. T. Thorlakson, of Winnipeg.

The choice of speakers was excellent and in their addresses and papers each one gave us a great deal of thoughtful information. Dr. Herman Robertson outlined the advantages of federation of the medical profession, in every province of our Dominion. He remarked that some day the health insurance scheme now being tried in British Columbia would sweep through Canada. The medical profession should be solidified so that the question might be approved from a national point of view.

Dr. T. C. Routley addressed the members of the Canadian Club at a luncheon in the Elizabethan Room of the Hudson's Bay Company's store on Canada's health problems. He outlined the need for health programs for the individual, the community, the province and the nation. He deplored the tendency of the press to print articles designed to whip up excitement. He hoped the press would take the lead eventually in moving toward greater social tranquility, though he admitted that the public must cooperate and not demand sensationalism in its reading material. He urged upon his hearers the necessity of taking advice from their physicians who had scientific knowledge at their disposal.

The Hon. W. W. Cross, Minister of Health, spoke at the annual banquet and expressed his opinion that the Sterilization Act would be strengthened, in view of the slowly increasing number of mental defectives in Alberta. He had something to say about the public as a whole, who were not accepting the diagnosis of medical men regarding their complaints. People are going to other branches of the healing profession. If medical men are not covering all methods of treating the human body they should broaden out. No form of treatment which is of service to the human body should be neglected. The public think they are neglecting some forms of treatment.

Dr. D. S. Macnab, the retiring President of our Association, referred to the unsatisfactory economic position of the medical profession and to the possibility of an incoming era of health insurance for the people. The term "health insurance" which he used and which is now under trial in an Ontario district, where the physicians are assuming responsibility for the care of the health of a whole community, looks like the answer of the doctors to long insistent demands for state medical service.

The program of the various sessions was of a high order. A notable feature was the number of the younger members who contributed interesting papers.

The entertainment of the guests was well provided for. Afternoon tea at the home of Mrs. A. E. Shore, and a dinner and bridge at the Glencoe Club were pleasant events.

The officers of the Provincial Association for 1936-1937 are as follows: *President,* Dr. W. F. Gillespie, Edmonton; *President-elect,* Dr. J. K. Mulloy, Cardston; *Hon. Sec.-Treasurer,* Dr. George R. Johnson, Calgary; *Librarian,* Dr. H. C. Jamieson, Edmonton; Alberta Representative on the Executive Committee of the Canadian Medical Association, Dr. D. S. Macnab, Calgary.

Alberta Representatives on the Council of the Canadian Medical Association: Drs. W. F. Gillespie, Edmonton; B. C. Armstrong, Medicine Hat; G. C. Reinhorn, Bellevue; B. R. Mooney, Edmonton; D. S. Macnab, Calgary; R. B. Francis, Calgary; George R. Johnson, Calgary; F. T. Campbell, Calgary; Gordon Gray, Edmonton; and A. E. Archer, Lamont.

Editorial Board: Drs. G. E. Learmonth, *Chairman,* Calgary; Gordon Gray, Edmonton; R. B. Francis, Calgary, and J. S. Wright, Edmonton.

Chairmen of Standing Committees: Drs. W. G. Anderson, Wardlow, *Legislation;* L. C. Conn, Edmonton, *Medical Education;* G. R. Johnson, Calgary, *Finance;* A. C. McGugan, Ponoka, *Public Health and Mental Hygiene;* R. Parsons, Red Deer, *Economics;* I. R. Bell, Edmonton, *Pharmacy and Hospital Service;* M. R. Bow, Edmonton, *Cancer;* Ross Vant, Edmonton, *Maternal Welfare.*

G. E. LEARMONTH

Hospital Service Department Notes

Sterilization of Surgical Supplies

Among the interesting papers presented at the recent New Brunswick Hospital Association convention was one from the St. John General Hospital, and read by Miss L. Belding, R.N., on certain studies of sterilization processes made in that hospital. Two years ago 686 temperature studies were made, bacteriological checkups being made in 616 of these tests. At that time it was found that the minimum sterilizing temperature of 225° F. (18-20 pounds steam pressure) was not reached within the bundle intra drum in all instances until after 30 minutes had elapsed. What was recorded for this interval held good for all subsequent intervals up to and including 60 minutes. Tatler thermometers were used.

Since then 600 more observations have been made, this time using the Aseptic-Thermo-Indicator, an indicator used to check up the attainment in the bundles of sterilizing temperatures. These were placed in the centre of intra-drum bundles or in the centre of a bundle of linen near the bottom of the sterilizer near the door—the area where sterilization is often incomplete. Using the procedures indicated by the previous series of tests it was found that 596 of the 600 indicators showed a change of colour in the indicator arrow, thus signifying sterilization. In two instances the thermometer failed to register the desired temperature; in the other two a temperature higher than 255° F. was registered. It was concluded that the observations reported by the Aseptic-Thermol-Indicators can be considered as correct.

Certain precautionary procedures in sterilization were urged. Drums, bundles and instruments should be placed on their sides or edges; drum slides and container tops should be open. Plenty of time must be taken to allow the heat to penetrate the load completely before closing the door. A vacuum of 15 inches is desirable to evacuate the air, as air and steam do not mix. From 10 to 15 minutes should elapse after the door is closed before the vacuum valve is closed. Sterilizing time should not be counted before the indicator reaches 255° F.; 60 minutes should be allowed for drums and 45 minutes for dressings. At the close of the sterilization period a vacuum is made to dry out the load before opening the door. As a sudden inrush of air could easily contaminate the complete load, the door is only "cracked" at first and left for a time before opening fully. If the sterilizing process has been properly carried out all dressings should be light in weight, dry to the touch, and easily handled.

All communications intended for the Department of Hospital Service of the Canadian Medical Association should be addressed to Dr. Harvey Agnew, 184 College Street, Toronto.

Legal Decision That the Nurse Anæsthetist Does Not Violate Medical Practice Act

Recently a decision was handed down by the California courts that in giving an anæsthetic a nurse anæsthetist does not violate the state Medical Practice Act. Two practising physicians brought a proceeding to obtain an injunction to restrain the defendant and another from administering general anæsthetics in connection with operations. (Chalmers-Francis v. Nelson, 57 P. (2) 1312 (1936). The plaintiffs contended that such practice on the part of the defendant constituted the illegal practice of medicine in violation of the Medical Practice Act of California. The evidence, according to a review in a recent issue of "Hospitals", showed that everything which was done by the defendant nurse in this case, and by nurses generally, in administering anæsthetics, was done under the direction and control of the operating surgeon. The court held that nurses, in preparing for and assisting in the operation, were not diagnosing or prescribing within the meaning of the Medical Practice Act. It was recognized by the court to be the rule that in such instances the nurses are merely carrying out the orders of the physicians, and that the nurses are subject to the authority of the attending surgeon. This followed logically, since it is the duty of the operating surgeon to so direct and control the nurses who assist him in the operation. The fact of supervision by the surgeon was held to be the controlling point of the case, for it is certain that when the nurse is subject to the direction and control of the surgeon she is not "prescribing" nor "diagnosing" within the meaning of those words as used in the Medical Practice Act.

This decision is not one which would meet with general favour in this country. It is difficult to understand how any one could expect a surgeon doing a major operation to direct every detail of the administration of the anæsthetic drugs by the nurse. The surgeon has all he can do without taking the responsibility for proceedings beyond the operating field. Surgeons who in emergency have had to employ unqualified anæsthetists and have had to direct the administration almost drop by drop of the anæsthetic know the tremendous strain of such responsibility. Nowadays, with the head of the patient cut off from the vision of the surgeon by the anæsthetist's screen, the surgeon's only knowledge of the patient's condition is what is given by the depth and regularity of the breathing and the colour of the blood, and perhaps straining. Once the operation is begun the control of the surgeon over the anæsthetist is usually limited to a request for deeper anæsthesia if that be necessary; in perhaps a greater number of instances the control may be the other way, for the anæsthetist may not only request but insist that the operation cease. The administration of an anæsthetic implies the administration of exceedingly potent drugs, an overdose of which would endanger life. From

the viewpoint of a non-legal observer it would seem that in such administration as the administration of potent drugs, the dosage and method of administration are factors which perforce in the majority of cases are determined by the person giving the anæsthetic.

In Canada such would appear to be considered as the practice of medicine. Some time ago our Department of Hospital Service gathered information concerning the status of nurse anæsthetists in the various provinces. These data are synopsized in the *Canadian Hospital Council Bulletin No. 11* which deals with nursing and nurse training in Canadian hospitals. According to this summary the nurse anæsthetist is not officially recognized in any province in Canada. In Nova Scotia one hospital has the legal right to appoint a nurse anæsthetist, but the privilege has not been exercised. In New Brunswick the nurse anæsthetist is used in some of the small centres, but so far no action has been taken against this procedure. Nurse anæsthetists have been used to some extent in Montreal, but the College considers anæsthesia to be a medical act and requiring the services of a licensed physician, and has so notified the hospitals. Of course, in isolated areas or in cases of emergency a nurse, or any person for that matter, may give an anæsthetic, but in such cases the legal responsibility for such administration rests with the doctor in charge of the procedure.

Provincial Association Notes

The New Brunswick Medical Society

The 56th Annual Meeting of the New Brunswick Medical Society was held at Kent Lodge, Bathurst, N.B., on September 8 and 9, 1936. The attendance was up to standard and the entertainment provided was excellent. Dr. J. M. Barry, President of the Society, occupied the chair at all meetings. Dr. R. G. Duncan, mayor of Bathurst, and Dr. C. J. Veniot, M.P., welcomed the guests on their arrival.

The chief business before the Society was the approval of a new set of by-laws, preparation of which had been in the hands of a Committee under the chairmanship of Dr. J. R. Nugent. The new by-laws, when amended, were approved and their publication authorized. These new by-laws consolidated a series of changes which have occurred in the last number of years, providing for elective representation on the Executive Committee of the Society from each branch Society throughout the province.

The New Brunswick Medical Society has long enjoyed the advantage of having a 100 per cent membership of the physicians practising in the province, due to the fact that the annual fee comprises the levy of both the Council of Physicians and Surgeons and that of the Society. The Workmen's Compensation Board Buffer Committee reported through its chairman, Dr. R. A. Hughes, that Workmen's Compensation Board matters had been satisfactorily arranged throughout the year by this liaison Committee.

Both the Secretary and the Registrar of Council reported the deaths of a very large number of members during the year, amounting to 5 per cent of the total registration. In this list of deceased members there appeared the names of many men who had left an indelible mark on the structure and activity of the Society over the course of a number of years. The Society at this meeting offered a feeling tribute to the memory of these men.

Under the new by-laws a nominating committee brought in a recommended slate of officers and committees for the following year, and this slate was unanimously adopted. It is felt that this Nominating Committee will prove of definite benefit in the smooth work of Society promotions. The slate of officers and committees for the following year is as follows: *President*, Dr. A. L. Gerow, Fredericton; *First Vice-President*, Dr. J. R. Nugent, Saint John; *Second Vice-President*, Dr. W. E. Gray, Milltown; *Treasurer*, Dr. R. M. Pendrigh, Saint John; *Secretary*, Dr. A. S. Kirkland, Saint John; *Additional members of the Executive*, Drs. Arthur VanWart, C. J. Veniot, J. F. L. Brown, Albert E. Macaulay, P. Atkinson, A. Sormany and H. Everett.

The Workmen's Compensation Board Committee was re-elected. This Committee is composed of Drs. R. A. Hughes, O. B. Evans and Jos. Tanzman.

The Cancer Committee for the year 1936-7 will be composed of the following: Drs. A. L. Gerow, A. S. Kirkland, J. M. Barry, H. E. Britton, G. F. Skinner and J. A. M. Bell.

The Golf Committee: Drs. W. E. Gray, W. Warwick and E. C. Menzies.

Additional members to the Canadian Medical Association Council were elected as follows: Drs. J. R. Nugent, D. C. Malcolm, J. C. VanWart, W. L. Earle, C. J. Veniot and J. A. McNaughton.

The G. Clowes VanWart Golf Trophy was won by Dr. W. E. Gray, Milltown.

An invitation was received from the Moncton Medical Society asking that the New Brunswick Medical Society hold their next annual meeting in Moncton.

A scientific program comprised six papers as follows: "Diaphragmatic Hernia, with a Report of four Cases," by Dr. George F. Stobie, Belleville, Ont.; "The Present Status of the Cancer Problem," by Dr. R. A. H. Mackeen, St. John, N.B.; "The Treatment of Fractures," by Dr. J. H. Couch, University of Toronto; "Thoracoplasty in the Treatment of Pulmonary Tuberculosis," by Dr. G. F. Skinner, surgeon for the Saint John Tuberculosis Hospital; "The Diagnosis and Treatment of Conditions Associated with Jaundice," by Dr. Ray F. Farquharson, Toronto University; "The Treatment of Pneumonia," by Dr. L. C. Montgomery, McGill University.

The presentation of these papers was received with delight by the large audience, and the close attention and animated discussion which resulted proved the interest of the listeners. It was a noticeable feature that the speakers were all a younger generation than is frequently noted at medical meetings. A motion picture film was exhibited during the meeting, entitled, "The Teaching of Diabetics". This film, which included a considerable amount of colour photography, had been prepared by Dr. A. E. Macaulay and Dr. W. O. McDonald of Saint John. Both the photographic and clinical work were the result of the efforts of these two physicians. The exhibition was given a flattering reception.

At the mid-day luncheon on the last day of the meeting, the guests of honour at the head table included Dr. Herman Robertson, President of the Canadian Medical Association, Dr. Charles F. Martin, of Montreal, and Dr. T. C. Routley, General Secretary of the Canadian Medical Association. Dr. Robertson spoke briefly on medical affairs throughout the Dominion and made special reference to public health matters in British Columbia, and to the scheme of confederation at present under discussion by the Canadian Medical Association. Dr. Routley, who is an honorary member of the New Brunswick Medical Society, took part in the several business sessions of the Society, and his valued advice was appreciated by the Society in several matters under discussion.

A. STANLEY KIRKLAND.

The Saskatchewan Medical Association

The Twenty-eighth Annual Meeting of the Saskatchewan Medical Association was held in Saskatoon. The business meeting was very enthusiastic; the discussions were interesting; everyone was out for business. The chief topic of discussion was whether to do away with the Saskatchewan Medical Association and have all the business of the profession done by the College of Physicians or to remain as at present constituted. The feeling is that as things stand nothing is being done to benefit the medical profession; the doctors, especially the men in the country, have borne so many injustices in the name of the depression; that one organization passes the work along to the other, and that by passing it back and forth things are not dealt with; that if one organization was responsible for medical affairs more action would result. The arguments against amalgamation are that Saskatchewan will differ in medical organization from all the other provinces; that the organization will no longer be a voluntary one which may or may not be joined, but it will be a compulsory body and every practising physician will be compelled to join it if he practises medicine legally; that the power will be vested in the legislature rather than in the medical profession. A vote was taken and it was decided to reorganize the medical association into one statutory body. The following officers of the Saskatchewan Medical Association were elected to hold office until the reorganization: *Honorary President*, Dr. D. P. Miller, Prince Albert; *President*, Dr. D. M. Baltzan, Saskatoon; *First Vice-President*, Dr. E. B. Alport, Regina; *Second Vice-President*, Dr. O. M. Irwin, Swift Current; *Representatives to the Canadian Medical Association Council:* Drs. J. E. McGillivray, Weyburn; L. M. Hanna, Brownlee; C. W. Thorne, Melfort; A. R. Gordon, Lloydminister; A. L. Caldwell, Cabri; A. L. Cornish, Arcola, and R. K. Johnston, Eston; Representative on the Anti-Tuberculosis League directorate, Dr. F. W. Hart, Indian Head.

The following scientific program was given: "Some Acute Abdominal Conditions in the Aged," by Dr. A. L. Caldwell, Cabri; "Thoughts on Hay Fever," by Dr. A. N. Hardy, Regina; "Carcinoma of the Rectum and Recto-Sigmoid," by Dr. P. H. Thorlakson, Winnipeg; "The Toxæmias of Pregnancy," by Dr. Ross B. Mitchell, Winnipeg; "The Psychological Factor in the Treatment of Disease," by Dr. A. O. Rose, Hafford; "Difficulties in the Diagnosis between Hyperthyroidism and Anxiety States," by Dr. Trevor Owen, Toronto; "Intestinal Obstruction," by Dr. C. W. Thorne, Melfort; "The Ankle: Its Common Injuries and Deformities," by Dr. Duncan Croll, Saskatoon; "Migraine Types: Treatment Policy," by Dr. Trevor Owen; "The Present Status of the Surgical Treatment of Epilepsy," by Dr. L. H. McConnell, Saskatoon; "Acute Pancreatitis," by Dr. P. H. Thorlakson, Winnipeg; "Experience with Fifty-Seven Cases of Undulant Fever in Saskatchewan," by Dr. D. M. Baltzan, Saskatoon; "Obstetrics Through the Ages," by Dr. Ross B. Mitchell.

LILLIAN A. CHASE.

Medical Societies

The West Kootenay Medical Association

The Annual Meeting of the West Kootenay Medical Association was held in Trail, B.C., on September 22nd, under the presidency of Dr. J. Bain Thom, of Trail. Twenty-one doctors attended. After welcoming the out-of-town members, some of whom, like Dr. Tyerman, of Nakusp, had come 150 miles, the President introduced the following new members, Drs. N. Jones and B. Dunhom, of Nelson, and Dr. Beckwith, of Castlegar.

A short clinical program with presentation of cases followed. Dr. M. E. Krause, of Trail, gave a paper on "The Ambulatory Treatment of Fractures of the Dorsal and Lumbar Vertebræ"; discussion by Dr. Coghlin; Dr. J. S. Daly, of Trail, gave a paper on "Disseminated Sclerosis," with presentation of three cases. Dr. M. R. Basted, of Trail, gave a talk on "Sacro-iliac Disease treated by the Smith-Peterson Operation," with

presentation of a case. Dr. W. Laishley, of Nelson, spoke on "Lateral Sinus Thrombosis," with presentation of a case; Dr. W. Leonard, of Trail, on "Ectopic Gestation".

Dr. W. H. Hatfield, Provincial Medical Director of Tuberculosis Control, Vancouver, B.C., gave an interesting account of the work being done by his clinic.

At the banquet following the meeting Dr. M. W. Thomas, Secretary of the College of Physicians and Surgeons for British Columbia, outlined the work of the College and told of the help it was rendering the profession. He pointed out that his organization was for the use of the general profession, especially the doctors in outlying places, and he urged that they make more use of his services.

The following officers were elected for the ensuing year: *Honorary President*, Dr. C. M. Kingston, Grand Forks; *President*, Dr. F. M. Auld, Nelson; *Vice-President*, Dr. H. F. Tyerman, Nakusp; *Secretary-Treasurer*, Dr. W. Laishley, Nelson.

The meeting next year will be held in Nelson in the fall.

J. S. DALY.

University Notes

McGill University

At the beginning of October Dr. A. Grant Fleming assumed the duties of the Deanship in the Faculty of Medicine, in succession to Dr. C. F. Martin. He brings to his task a wealth of experience in administrative and health work.

Dr. Fleming was born in Toronto on April 23rd, 1887, and received his early and university training in that city. He received the degree of M.B. from Toronto University in 1907 and the Diploma in Public Health in 1914. After graduation he began a noteworthy career in the field of public health. In 1908 he was appointed bacteriologist to the department of Public Health, Toronto, and in 1919 became director of the laboratories in the same department. A Dominion appointment followed a year later, when he was made director of the divison of venereal disease prevention in the federal Department of Health. In 1921 he accepted a teaching appointment, being made a demonstrator in the department of hygiene and preventive medicine, University of Toronto. At the same time he joined the staff of the Riverdale Isolation Hospital. With his return from the Ottawa appointment, he was also made deputy medical officer of health, City of Toronto, a post which he held until 1924.

In 1924 Dr. Fleming came to Montreal to take up a post as managing director of the Montreal Anti-Tuberculosis and General Health League, an organization brought into being through the life-long desire of Lord Atholstan to better the health conditions of the city. The choice of Dr. Fleming was fully justified, for he entered with great enthusiasm and ability into the fight. McGill University recognized his administrative and teaching ability, as three years after coming to Montreal, in 1927, he was made acting director of the Department of Public Health and Preventive Medicine and was made director of the department a year later.

During the Great War he gained an enviable record overseas. He was commanding officer of the Camp Laboratory Unit, Military District No. 2 in 1916 and until 1917 was pathologist to No. 15 Canadian General Hospital. Between 1917 and 1918 he served with the First Canadian C.C.S., No. 1 Canadian Field Ambulance, and the Fourth Canadian Infantry Battalion. He was awarded the Military Cross for his distinguished services.

In 1918 Dr. Fleming was appointed assistant to the consultant to the Canadian Forces in Hygiene and Sanitation. These duties took him to England where he served under Dr. John A. Amyot.

Dr. Fleming is associated with a great many agencies and institutions concerned with public health and welfare, notably the Montreal Board of Health, the Montreal Council of Social Agencies, the Child Welfare Association of Montreal, the Canadian Public Health Association, the Canadian National Committee for Mental Hygiene, the American Public Health Association and the Commonwealth Fund of New York. From 1928 to 1936 he was associate secretary of the Canadian Medical Association. He comes to McGill at the commencement of a new era, namely, the institution of a reorganized medical course.

James Bertram Collip, Professor of Biochemistry at McGill, was awarded an LL.D. degree, *honoris causa*, by Harvard University at the recent tercentenary celebrations.

University of Toronto

Faculty of Medicine

The following awards have been made by the Senate of the University:

George Armstrong Peters Prize in Surgical Science, to Clifford Harold Watson, M.B.

Starr Gold Medal, to William Leslie Donohue, M.A., M.D.

Faulkner Medal in Psychiatry, to George Edgar Hobbs, B.A., M.D.

Toronto Women's League of the United Synagogue, to George Alan Lane.

Baptie Scholarship, to John Garvey Mickler.

Special Correspondence

The Edinburgh Letter

(From our own correspondent)

The medical profession in Scotland will welcome the appointment of Dr. J. W. McNee to the Regius Chair of Medicine in the University of Glasgow, rendered vacant by the resignation of Prof. T. K. Munro. In coming to Glasgow Prof. McNee is returning to his home, for he is the son of a Glasgow man and was a student at Glasgow University. He has a large consulting practice in London and is a most efficient and popular teacher of medicine. He was recently appointed consulting physician to the Royal Navy. He is joint author of one of the leading textbooks in the English language on diseases of the liver. During the European War he was a Major in the R.A.M.C. and acted as pathologist to the First Army in France. He received the D.S.O. in 1918 and was mentioned in dispatches for his scientific work on trench fever, gas gangrene, and gas poisoning. An important lay journal, commenting on the appointment, says, "It is not often that a consulting physician in the heyday of a successful career in the metropolis and on the honorary staff of one of its great teaching hospitals can be lured north, whatever the inducement". Dr. McNee's career is in the best tradition of British Medicine, and Glasgow University is fortunate in securing his services.

The fifth Annual Report of the Department of Health for Scotland on incapacitating sickness in the insured population of Scotland has recently been published. The information it contains is based on the medical certificates received by the Approved Societies operating in Scotland. In the Department's view the statistics clearly indicate a level of health and physical fitness very much below not only what it should be but what it might be, for much of the sickness is attributable directly or indirectly to general factors such as unsatisfactory housing, defective diet, poverty in the wide sense, and, in some industries, the deleterious aspects of occupational environment. The Department suggests that research should be undertaken into these environmental factors with a view to their improvement or removal, or, if this be impracticable, the institution of speedier and more effective means of treatment. It has been realized for some years that coal miners are more susceptible as a class to sickness, apart from accident, than are other classes of the population, and in the various coal mining areas of Scotland the heavy rate of sickness, and particularly of selected kinds of sickness, leaves little doubt as to the occupational relationship to the incapacitating conditions. Many theories have been advanced as to the reason for this. It has naturally been suggested that as a result of their underground work miners suffer from the deprivation of sunlight but this has not been shown to be necessarily the case. In some areas the men are constantly wet while at work, and in low seams the working position is cramped; on the other hand the temperature in which they work is more constant than in the case of outdoor workers. It has been suggested that their diet is unsatisfactory and that too much use is made of the frying pan. In some areas the housing is poor but in others it is quite good. It is very likely, however, that one of the main causes of the heavy evidence of sickness is the change that has taken place in the methods of haulage now employed. The men have to keep pace with the machine and the work in consequence involves regular and prolonged strain. It has also been suggested that the miner may suffer from an inferiority complex associated with his position in the industrial world. It is evident however from the statistics now published that more attention should be directed to the problem and that information should be obtained regarding the effect of other heavy occupations on the health of the workers.

A meeting of the honorary secretaries of the branches of the British Medical Association in Scotland and other specially interested persons was recently held in Edinburgh to hear an address by Major Stuart Blackmore, the Medical Adviser to the Air Raid Precautions Department of the Home Office, on the subject of the training of the medical profession in anti-gas measures. It is felt that such training forms a vital link in the plans that are being made for the protection and succour of the people in the event of hostile air-raids. Courses of instruction for practitioners will be held in convenient centres, the arrangements being such as to enable the doctors to attend the courses without too much interference with their ordinary work.

The Minister of Health has just announced that in pursuit of the policy of the Government regarding the development of the various social services he is to propose to Parliament that old-age pensions shall be made available to blind persons at 40 years of age (that is ten years earlier than at present) and that domiciliary provision for blind people shall be made not by way of Poor Law relief but under the Blind Persons Act. This is a humane proposal and one that will be welcomed by all sections of the community. It is in line with various steps that have already been taken to dissociate medical treatment from the Poor Law. Parliament has already recognized that a separate local authority hospital service for the sick poor is undesirable. The next step should be to bring the domiciliary medical service for the sick poor into line with this highly desirable policy. As regards blindness in children, it is highly encouraging to note that since 1925 the number of children between the ages of 5 and 16 suffering from blindness has declined from 2,720

to 1,855. This reduction in the number has coincided with the more adequate and effective arrangements made by local authorities for the immediate treatment of all notified cases of ophthalmia neonatorum. R. W. CRAIG.

7 Drumsheugh Gardens,
Edinburgh.

The London Letter

(From our own correspondent)

The British Association for the Advancement of Science has been meeting at Blackpool and providing a lot of material for the lay press during the holiday period. In the one hundred years that this Association has been in existence there has been a remarkable change in the attitude of society to science, and to this aspect of the subject the President, Sir Josiah Stamp, devoted himself in his presidential address. There was a time when science was suspect, on the one hand because of its supposed antagonism to religion, and on the other because it lured men from the study of the humanities into a narrow pursuit which had no moral value. At the present time the difficulty is to make a satisfactory adjustment for the tremendous innovations which scientific discoveries are constantly causing in the whole social system. On the one hand improvements in industrial methods may lead to temporary unemployment and on the other there is an unfortunate lag before certain advances produce their full benefit for mankind. In the medical field this "improvident tardiness" is particularly important, for probably by taking full advantage of the modern discoveries in nutrition a great deal can be done for the health of the nation. Rickets still occurs, and even scurvy is not uncommon, while there are many doctors who do not understand how to use insulin thirteen years after its discovery. In the Sectional Meetings such subjects as fatigue in industry, the application of science to the problem of road accidents (including the relation of alcohol to such disasters), climatotherapy, the psychology of guilt, the use of and abuses of the examination system, and the strain of modern civilization were among the subjects discussed.

A good example of the failure to apply scientific discoveries is seen in the somewhat tragic outbreak of typhoid at a well-known seaside resort during the holiday season. Several hundred cases with a not inconsiderable number of deaths were caused by an infected milk supply. The milk in question was raw milk and pasteurization, which was put into force the moment the source of the epidemic had been discovered, has effectively controlled the outbreak. This problem of pasteurization can only be solved by the type of benevolent dictator suggested by Sir Josiah Stamp at the Blackpool meeting. The majority of the medical profession would undoubtedly favour such a step, although there are still some who apparently consider 2,000 deaths from bovine tuberculosis yearly, epidemics of streptococcal sore throats, and disasters like this typhoid outbreak, a fair price to pay for the supposed virtues of raw milk. From the commercial aspect, lip service is paid to pasteurization in big cities because it prevents stale milk from going sour. The milk supply of this country is now very much organized by a special board and great efforts are being made to get us to drink more milk. No guarantee, however, is given as to its purity, and it is difficult to get whole-hearted support for an increased consumption of a product which may be directly responsible for death. It should be noted that the dairy concerned in the typhoid outbreak had a very good reputation and its general standards were satisfactory.

While there is increasing talk of the likely extensions of State Medicine in the future it is not only important that every detail of the present schemes be scrutinized with care by the medical profession, but also any attempt at "tyranny" has to be stoutly resisted. Recently it has been announced that the British Medical Association has been protesting vigorously, and so far without effect, against certain regulations which determine the fees of the medical profession for giving anæsthetics to dental patients under the National Health Insurance Act without any consultation with the profession. It appears that a body called The Dental Benefit Council, on which there are no medical representatives, has laid down certain scales of fees, and on the advice of the Council, the Minister of Health has issued new regulations which are termed "monstrous" in a statement by the British Medical Association. Put briefly, it means that if a patient wishes to pay the medical anæsthetist something more than the very low fees allowed (four teeth for five shillings!), then the insurance companies will refuse to pay any part of the scale fee. If the doctor charges a higher fee the dentist must pay the difference out of his own pocket. This does not seem to be a satisfactory state of affairs, and the matter is being strongly pressed for a further review.

Much has been written about Lord Moynihan's life and work, but to many of the younger men in this country it was his towering character and his amazing surgical craftsmanship which will be most greatly missed. Under Moynihan's leadership the whole attitude of surgeons to the details of operations has undoubtedly changed within a generation, and to have worked with this great personality was to have come in contact with a master whose disciples now must carry on the torch. In countless centres, not only in London and other parts of the country but all over the world, the routine and ritual of the operating theatre is modelled exactly upon what happened at Leeds.

ALAN MONCRIEFF.

121 Harley St.,
London, W.1.

Letters, Notes and Queries

Changes in Blood-Pressure Resulting from Artificial Pneumothorax

To the Editor:—

I would be pleased to hear comments from my colleagues in reference to blood pressure changes influenced by artificial pneumothorax, in patients with pulmonary tuberculosis treated by this method.

A patient often will complain that he feels he has need of some air in his chest about the time his treatment is due—about from one to three weeks following his last treatment. In over fifty cases which I investigated this depressed feeling and heavy headache of which the patients complained was due to a gradual lowering of the blood pressure because of air absorption, and relaxation of the greater vessels and the conus arteriosus. A few hundred cubic centimetres of air was sufficient to raise the blood-pressure back to optimum level, and the patient felt a general exhilaration and his headaches disappeared. The more air injected, the higher the blood pressure climbed. In my opinion this blood pressure change is very beneficial as it acts as a great tonic. The change is not marked in cases with effusion, and the pressure is too variable to experiment with this condition.

W. ARNOLD FARRELL.

344 Pacific Ave., Toronto,
Sept. 22, 1936.

Will some of our readers please give their ideas.
[ED.]

Maternal Welfare

To the Editor:—

I have tried to harmonize a recent widely circulated pamphlet on Maternal Welfare, with "A Further Report on Obstetrical Analgesia and Amnesia". Both provide excellent reading, and both are thought-provoking. The question that no doubt many doctors ask themselves is: Which of the two appeals most to the recent graduate?

Many Canadian country doctors, I dare say, find that perhaps one mother in a thousand requires a Cæsarean section, that mid-forceps deliveries are rare, that from 90 to 95 per cent of deliveries, including those of primiparæ, are spontaneous, and that the routine use of a little chloroform in the late stage of labour has been found harmless in thousands of confinements.

H. J. SCHMITT.

Arborfield, Sask.,
Sept. 21, 1936.

Answers to questions appearing in this column should be sent to the Editor, 3640 University Street, Montreal.

Topics of Current Interest

Sterilization of Catgut

The recent occurrence of a total of nine cases of post-operative tetanus in three different hospitals in this country has led to the publication by the Ministry of Health of a memorandum[1] drawing attention to the danger of using catgut supposedly sterilized by methods which have long been known to be ineffective. This memorandum is a digest of the more detailed paper read by Sir Weldon Dalrymple-Champneys to the Surgical Section of the Royal Society of Medicine in February last.[2] Since 1930 a regulation made under the Therapeutic Substances Act has ensured that material sold as sterilized surgical catgut shall have been properly treated to secure sterility; the only present danger is from "raw" or so-called "partially" or "internally" sterilized catgut which is to be finally sterilized by the user. It is perhaps even now not generally recognized that the destruction of highly resistant spores embedded in a material such as catgut is one of the most difficult of all problems in chemical disinfection, and that the demonstration of its achievement by cultural methods is beset with pitfalls which in the past have led to innumerable errors.

In Bulloch's masterly review,[3] which made all the necessary information on this subject available seven years ago, there is page after page of patient exposure of the inefficacy of many methods on which reliance has been placed in the past, and of the constantly recurring error due to performing sterility tests with material still impregnated with an antiseptic. Only three agencies will destroy spores in catgut without destroying the gut itself; these are heat, hydrogen peroxide, and iodine. The secrets of applying a sufficient degree of heat without excessive damage to the gut is known only to certain manufacturers, and hydrogen peroxide is adaptable only to an early stage of the manufacturing process. Iodine, therefore, remains the only effective reagent applicable by the user, and it has to be employed in a certain way. Long after Claudius, whose solution is still often used, had demonstrated that iodine is only effective in watery solution, it was recommended by various writers that the iodine should be prepared in spirit; such solutions are ineffective. The method of treating catgut differed in each of the three hospitals in which post-operative tetanus has occurred recently. In one, the gut was boiled in xylol for half an hour and stored in spirit; in the second it was placed in oil of cloves for fourteen days and in absolute alcohol for eight days, or, in the case of chromicized catgut, it was immersed in a solution of 1 in 250

1. Ministry of Health. Memo. 199. Med., August, 1936.
2. *Brit. M. J.*, 1936, **1**: 328.
3. Medical Research Council, Special Report Series, No. 138, 1929.

mercury biniodide in absolute alcohol for eight days. In the third, so-called "internally sterile" catgut was treated, according to a recommendation by the manufacturer, by immersion in 5 per cent carbolized alcohol for "not less than forty-eight hours": the author of instructions which reckon the period of effectiveness of this solution in hours will perhaps by now have had his attention drawn to Bulloch's observation that ligature material was still not sterile after immersion in 5 per cent carbolic acid for twenty years. Years, and not hours or days, represent the capacity for survival of bacterial spores, not only in this solution, but in spirit and in solutions of binoidide of mercury, both stronger than those commonly employed and maintained at incubator temperature to accelerate their action.

These unfortunate occurrences, and the publicity which they have now received, should go far to brush away the final cobwebs of misapprehension on the subject of surgical catgut. Anyone buying raw gut is assuming a serious responsibility, and "home-curing" methods, even if their results have hitherto been so fortunate as to give satisfaction, should be brought into line, if necessary, with present-day knowledge. The same treatment as for raw gut is evidently required for the so-called "partially sterilized" or "internally sterilized" catgut. These seem to be misleading terms, and there is a case for official action either to abolish their use or to restrict it to products made under license.—*Brit. M. J.*, 1936, **2**: 636.

Sunlight and Health

The belief that sunlight exerts a beneficial effect on health is at present exceedingly popular. Its general endorsement by the public is visible during the summer months at the beaches and summer resorts. The growing tendency to continue "sun bathing" throughout the year is indicated by the increasing numbers of "sun lamps" available on the open market and the rather large numbers of these devices purchased by the American people for use in their homes. But what is the scientific knowledge regarding the effects of sunlight and of ultra-violet rays on health? Does such information indicate a need for excessive basking in the sun's rays or does it suggest that this practice is unnecessary or perhaps even undesirable? Laurens[1] has recently reviewed the available knowledge in this field.

First, which of the sun's rays actually pass through the outer layer of the skin into the deeper strata? Studies have shown that practically all the rays in the extreme ultra-violet range are reflected from or absorbed by the outer, horny layer of the skin, whereas a considerable proportion of the longer ultra-violet, the visible and the near infra-red rays are transmitted and penetrate into the malpighian layer, the corium and, in the case of the visible and near infra-red rays, even the subcutaneous tissues. Thus, the horny layer of the skin apparently protects the deeper strata from the shorter ultra-violet rays. Pigment, which is present in the basal layer of cells of the stratum corium, apparently serves as a screen to prevent the "true skin" from receiving too much energy in the form of the longer ultra-violet rays.

The question of the effects of the rays that are transmitted by the stratum corneum into the deeper layers of the skin has received wide attention. Certain beneficial effects are well known, as, for example, the favourable influence of the ultra-violet rays on the assimilation of calcium and phosphorus and the resultant prevention or cure of rickets as the result of the formation of vitamin D in the skin. Favourable effects of moderate amounts of sunlight on the blood and circulation have also been described, particularly in increasing the platelet count in cases of idiopathic purpura hæmorrhagica and as an adjuvant to diet and standard therapy in the treatment of secondary anæmia. "Sunshine" carbon arc radiation has been alleged to cause a temporary decrease in both the systolic and the diastolic blood pressure in patients with essential hypertension. Natural sunlight, according to a number of authorities, hastens the healing of sluggish, indolent wounds by its local effect on the circulation of the blood and may be of benefit in tuberculosis of the skin (lupus vulgaris). Many believe that heliotherapy constitutes a valuable aid in the treatment of pulmonary tuberculosis. However, perhaps as many equally competent authorities feel that the results are "not likely to be spectacular and its omission not detrimental to the patient's best interest".

Harmful as well as beneficial effects may result from exposure to sunlight. Under certain conditions, as yet none too well defined, photosensitization may occur and the subject so sensitized may experience serious reactions on subsequent exposures to sunlight. A number of skin diseases, such as urticaria solaris and lupus erythematodes discoides, are probably due to this type of sensitization. Likewise it is well known that prolonged exposure to sunlight may cause not only inflammatory and degenerative changes in the skin but also systemic disturbances. One authority has stated that overexposure to sunlight may bring about damage to the central nervous system, especially the brain, as a result of heating of the skull.

Thus it is evident not only that sunlight may exert a beneficial influence on health but also that it may cause serious harmful effects. Laurens believes that the beneficial effects appear to be largely over-emphasized. As far as is known, man actually requires only a

1. LAURENS, H.: Sunlight and Health, *Scient. Monthly*, 1936, **42**: 312.

relatively small amount of sunshine for the maintenance of normal health, and the greatest danger perhaps at the present time lies in too much exposure to sunlight rather than too little. Certainly, over-indulgence in solar radiation should be avoided because of known possible ill effects. "Owing to the hypersensitivity of many infants and adults, caution should be used in the use of sunlight, both natural and artificial. Over-indulgence, even in the normal, is foolhardy."—*J. Am. M. Ass.*, 1936.

The Health of Women

The profound economic and social changes that have occurred in the lives of most American women and those of other civilized countries during the last fifty years have directed new interest to the health problems which concern women particularly. Theobald[1] has recently considered some effects of "emancipation" on the health of women. The freedom that has resulted from the achievement of economic independence of women has played and continues to play, he believes, a distinct rôle in the causation of maternal mortality. The deleterious effect is based on the fact that it is frequent for women to continue in unsuitable occupations late into pregnancy, and also that independence has probably resulted in a marked increase in the number of abortions. While there are probably many advantages in the relatively free association of the sexes, Theobald believes that many undesirable features have accompanied the changed situation. He believes that some effort should be made to educate the young concerning their personal responsibilities resulting from the "new freedom". Furthermore, the economic conditions that have led to the "taxi" dance halls and their equivalents should be remedied if for no other reason than the effect on maternal mortality.

Competitive sports among women have increased to a degree unprecedented in recent times. Theobald believes that physical exercise is as good for women as it is for men, but that excessive exercise is more harmful to women than to men. Biologically, it must be axiomatic that nothing can be good for a girl that renders her less capable of maternity. Exercise by itself does not appear to have a harmful effect on child-bearing, but it is not yet determined whether violent exercise exerts any effect on the development of the uterus or on subsequent fertility. The modern cult which permits even violent exercise during menstruation has no sound foundation. The nervous strain of competitive sport is probably greater for women than for men. The indulgence in competitive sports, from the author's observations, seems to have little effect on the posture of women, which in itself is probably of considerable importance. Few of the picked British female athletes had really good chest expansion and many were anæmic. The mental aspects of women's emancipation may be equally important. As one critic of the modern girl said, "She demands to be treated as an equal, she expects to be treated as a duchess, and she behaves like a washerwoman". Theobald goes on to say:

> She copies the coolie woman of the Chinese bazaar in plucking her eyebrows, the Siamese peasant in bobbing her hair, the Arab in letting her nails grow like claws and painting them a hideous red, the courtesan in painting all visible parts of her anatomy, and in painting and powdering herself in public betrays incredible vulgarity. She is so restless that she cannot sit peacefully at home; she cannot eat her meals without smoking, and is unhappy unless she is at the dance or cinema.

Although probably more applicable to the particular than to the general, no exception can be taken to the thesis that wanton expenditure of nervous energy begets nervous instability. But it is still too soon to determine what the ultimate effects of mass removal of women from the home will have on their nervous systems and those of their descendants. The question is debatable and if the divergences from biological normality are not too great the results can be good as well as evil.

Perhaps a corollary of the so-called emancipation of women is the specific health problem that is faced by women who marry. Goodwin[2] states that when a woman marries there are four main directions in which her life is to be altered profoundly: (1) responsibility for domestic management; (2) companionate life; (3) sex life and (4) reproductive life. With possible occasional exceptions these are all to be new experiences which may in one form or another profoundly affect a woman's physical and mental health. The responsibility for domestic management generally involves a much greater output of physical energy than that to which a woman has been accustomed. This fact should be realized by both parties and attempts made to minimize the possible danger of sudden change by various expedients, such as the adoption of a definite period of rest each day. The problem of companionate existence for a woman who marries is likely to be more difficult than for a man. This is largely because most men have been always to some extent dependent on female supervision, while a woman generally develops a philosophy of independence of the opposite sex. Furthermore, a woman cannot so easily escape the problems which the changed mode of life occasion. The third great change, that dealing with sexual life, has lately received much more adequate medical recognition, but it is certainly still true that in civilized Anglo-Saxon communities the adaptation is usually more abrupt and more difficult than it should be. Pre-

1. THEOBALD, G.: Some effects of emancipation on the health of women, *J. State Med.*, 1936, **44**: 359.

2. GOODWIN, A.: The health of the married woman, *J. State Med.*, 1936, **44**: 249.

liminary education should do much toward solving this problem. Finally, the problem of reproduction is one which practically every married woman has to face at some time. Here again the possibilities for physical and mental damage to the health are numerous. If carefully contemplated, both physical and mental reactions, however, can be modified in the proper direction. In spite of these difficulties, which might lead one to believe that the health of a married woman is more precarious than that of her unmarried sister, the reverse is actually the case. The biological norm is more closely fulfilled by marriage, and there can be no question that marriage will increase rather than diminish the mental and bodily well-being of a woman, provided simple rules of health are followed.

The questions brought out in these two articles are provocative. The significance of such studies is important from the point of view of individual health and also from that of the community.—*J. Am. M. Ass.*, 1936, **107**: 434.

Abstracts from Current Literature

Medicine

Occurrence of Macrocytic Anæmia in Association with Lesions of the Bowel. Butt, H. R. and Watkins, C. H., *Ann. Int. Med.*, 1936, **10**: 222.

Twenty cases were studied in which anæmia was associated with lesions of the ileum and colon. In 11 the anæmia was of the macrocytic variety, and in 6 of these the terminal portion of the ileum was involved in an inflammatory process. Apparently regional ileitis may produce a macrocytic anæmia the production of which does not depend on the amount of ileum involved. Hæmorrhage is not a factor. In this group of cases no change in the blood picture was noted after parenteral administration of liver fractions that are effective in the treatment of pernicious anæmia. It would appear that in regional ileitis, particularly, the process in some manner produces some change, perhaps in the form of a toxin, which prevents utilization of the hæmatopoietic principle by the liver. Since in most instances the blood picture can be distinguished from that seen in pernicious anæmia, factors other than failure of absorption and utilization of the hæmatopoietic principle may produce a macrocytic type of anæmia.

Carcinoma of the terminal portion of the ileum with obstruction, carcinoma of the cæcum, subacute ulcer of the ileum with partial obstruction, and diverticulosis of the left half of the colon and chronic ulcerative colitis of the right half of the colon were found associated with a macrocytic anæmia. Apparently any lesion of the bowel that produces obstruction may produce a macrocytic anæmia by interfering with the absorption or utilization of the hæmatopoietic substance. Those patients who survived operation and who were not subjects of true pernicious anæmia recovered from their anæmia without the administration of liver fractions.

The most outstanding symptom in this series of cases was cramping abdominal pain, and this in the presence of a macrocytic anæmia without the symptoms of pernicious anæmia should suggest a lesion of the ileum. Even without the abdominal pain, when other symptoms of pernicious anæmia are lacking, a macrocytic anæmia should direct attention to the small intestine and liver.

H. GODFREY BIRD

Surgery

Diagnosis of Cancer of the Stomach. Pratt, G. H., *Arch. Surg.*, 1936, **33**: 138.

According to the author there is no true early diagnosis of carcinoma of the stomach from roentgenograms. The size of the organ and its structure, with its various normal folds and rugæ, its *Magenstrasse*, and its sensitivity to intrinsic and extrinsic stimuli, make the detection of a small lesion uncertain.

The records of the last 100 patients with cancer of the stomach who were operated on at the New York Post-Graduate Medical School and Hospital were examined. Taking as criteria the classic requirements according to leading textbooks of surgery, namely, a relatively small growth, which is freely movable and which is unaccompanied with evidence of metastases or with ascites or with anæmia (less than 60 per cent hæmoglobin), one found that 1 per cent of the patients had growths that were definitely operable; in 24 per cent there was some question as to the operability, thus leaving 75 per cent of the patients potentially incurable. Pratt makes suggestions as to two diagnostic procedures. Just three years ago a German physician named Schindler and an instrument maker named Wolf developed the Wolf-Schindler flexible gastroscope, with its clever arrangement of lenses; this instrument has revolutionized the work. The first American report, by Benedict, of Boston, based on a study of 75 patients, demonstrated both the safety and the practicability of this instrument. Benedict recognized the presence of gastric carcinoma in 10 out of 12 cases, and in the first series of patients Jackson's results, in Philadelphia, were equally encouraging.

The second diagnostic procedure is the Gruskin test for malignancy. None has stood the test of time with such remarkable tenacity as this test. It is based on the fundamental consideration that malignant cells are born embryonic, in contradistinction to normal cells, which are not born embryonic but are mature. The protein of malignant cells is not the same

as that of normal cells. This test is based on injection of an embryonic antigen made from the most embryonic cells known, namely, epithelial cells from the embryonic calves' pancreas or liver, for carcinoma, and, for sarcoma, Wharton's jelly, which contains the embryonic stellate connective-tissue cells. One observer had 100 per cent correct results in 51 patients. The author had 92 per cent correct results in 100 patients. He remarks that "while more observation on the possibilities of the Gruskin test is necessary before one may advocate its acceptance over clinical judgment, the results so far are extremely encouraging".

G. E. LEARMONTH

Reconstruction of the Common Bile-Duct. Couch, J. H., *Brit. J. Surg.*, 1936, **24**: 130.

Edmund Morgan, in a monograph entitled "The Reconstruction of the Biliary Tract", gives a very complete review of all the methods that have been employed, but not of this one. This is a method for use when the damage has been done above the common bile-duct, *e.g.*, when all that is left is the right and left hepatic ducts without any extra hepatic tissue, and the stump of the common bile-duct is below.

The operation of choice at the present time in gall-bladder disease being cholecystectomy, injury to the common bile-duct has become much more common and is no longer rare. Whether the gall bladder is removed from below upwards or from above down, the underlying principle to safeguard the common bile-duct is direct visualization of the cystic and common ducts before any duct is divided.

The author cites the case of a Mrs. E. H., aged 40, with history of cholecystitis and biliary colic in 1910. She had had typical gall-bladder indigestion and occasional colic from 1910 to 1932. The gall bladder, removed in 1932, was difficult of handling owing to the dense adhesions. The cystic duct, dilated and full of faceted stones, so resembled the gall-bladder that it was removed completely. A portion of the common duct was either removed or so damaged as to be useless. For six months the patient was comfortable, with no external fistula, but then suffered from fever, chills and jaundice.

After preparation by transfusion and intravenous calcium chloride the abdomen was opened. Dense adhesions were present, but after clear exposure, two holes, 1 c.m. in diameter, were seen on the under surface of the liver, the gaping mouths of the right and left hepatic ducts. All that remained of the common duct was a small channel one inch long, extending upwards from the duodenum. Through the long arm of a T tube, a catheter was passed down and out through a cut in the junction of the T. Thus a four-way tube was made. One end was placed in each of the hepatic ducts, and one in to the cut end of the common duct, and the long end was brought out to the skin through a stab wound. The stump of the common duct, along with the duodenum, was brought up as close as possible to the under surface of the liver and fixed by sutures. The abdomen was closed. The author emphasizes the importance of clear and adequate exposure.

Convalescence was stormy, requiring repeated transfusions to combat continuous oozing. Loss of appetite and spirit due to the loss of bile was later treated by feeding back bile through a duodenal tube. The tube should remain in from six months to two years, until the injection of 20 c.c. of thorotrast and the x-ray show no undue sacculations of the biliary tree, and emptying occurs promptly.

S. A. MCFETRIDGE

Obstetrics and Gynæcology

Unavoidable Hæmorrhage. Berkeley, Sir C., *J. Obst. & Gyn. Brit. Emp.*, 1936, **43**: 393.

This paper deals with 5,107 cases of placenta prævia which occurred in the confinements of 500,988 women, with a critical study of 4,580 cases. Only those cases under the care of professors and chiefs of maternity hospitals in England, Scotland, Wales and Ireland were referred to. Placenta prævia occurred more frequently in multiparæ than in primiparæ; 20 per cent primiparæ and 79.9 per cent multiparæ, 69 per cent being 36 weeks or more pregnant, and 30.9 per cent under 36 weeks. The suggestion that placenta prævia occurs more frequently in multiparæ because of subinvolution and chronic endometritis is explained. According to Frankl the lower pole of the placenta is more firmly attached to the lower uterine segment when it abuts on it. When the lower uterine segment expands separation is likely to follow. The glycogen content of the mucosal cells being low in the region of the lower uterine segment is a handicap to the normal function of the placenta; therefore it is likely to become diffuse or membranous.

The cases of unavoidable hæmorrhage were divided into two groups: (1) those in which the cervical canal is sufficiently patent to allow a finger to be passed through it; (2) those in which the external os is closed so that a finger cannot be passed through it.

The use of uroselectan B is not recommended for diagnostic purposes because of the danger of inducing labour prematurely. Treatment:—(1) control the bleeding as soon as possible; (2) do not make a vaginal examination unless prepared to operate; (3) combat shock if present; (4) take every precaution to prevent septic infection; (5) do not hasten delivery except in Cæsarean section; (6) perforate the placenta if necessary with a sharp instrument; (7) treat the case in hospital. Allow the placenta to separate spontaneously; hurried separation tends to shock and infection. If blood pressure is below 100 mm., systolic, delay operation.

The commonest cause of death, apart from those who died during labour, was infection.

In 20.5 per cent of cases the placenta was near the vagina. Of the patients in whom the vagina was packed 23.5 per cent died of infection; 18.4 per cent died where the placenta was removed manually. The best results were obtained where gestation was over 36 weeks and Cæsarean section was done, the maternal mortality being 4.1 per cent, and 84 per cent of the children were born alive. Where the placenta was only partly over the os the best results were obtained by simple rupture of the membranes (1.2 per cent mortality); next, was Cæsarean section with 1.7 per cent mortality. Bipolar version gave 3.4 per cent and expectant treatment gave 3.6 per cent. For the children Cæsarean section gave 89.2 per cent living and expectant only 77.1 per cent. In the cases under 36 weeks' gestation again Cæsarean section and simple rupture of the membranes gave the best results. Bipolar version claimed a greater fetal mortality.

P. J. KEARNS

Pædiatrics

Omphalitis in the Newborn. Chamberlain, J. W., *J. Pædiat.*, 1936, **9**: 215.

Before the days of asepsis infection of the umbilicus in the newborn was a common occurrence. It still is seen often enough to merit serious consideration as an important complication of the neo-natal period.

The normal anatomy and the physiological changes taking place at the time of delivery must be understood. The two umbilical arteries arise from the internal iliac arteries in the pelvis. The umbilical vein passes upward to the under surface of the liver where it divides to join the portal vein and the inferior vena cava. When the cord is tied and cut these vessels become obliterated. Careful study of autopsy material shows this obliteration process to require from twenty to fifty days, a much longer time than is usually stated. Although fatal omphalitis is occasionally due to intra-partum infection, the majority of cases arise from post-partum contamination.

Four types are generally seen:—(1) moist umbilicus; (2) phlegmon; (3) ulcer; (4) infection of the umbilical vessels. It is important that no matter what type of lesion appears to be present it should be considered serious and the prognosis should be guarded. The simplest form consists of a granulating area in the middle of the umbilical wound with a slight mucopurulent discharge. More severe cases show more discharge, with or without palpable hypogastric arteries the patency of which at times may be demonstrated. Cellulitis and lymphangitis of the periumbilical tissues frequently are seen. Death is due usually to blood stream infection with multiple metastatic lesions in bones, joints, and viscera, or to direct extension with invasion of the peritoneum.

The presenting symptoms show a lack of specificity and in any illness in the newborn "it should be the rule to inspect and if necessary re-inspect the navel". Careful questioning will usually bring the history that the navel never healed or discharged pus for a varying length of time.

The mild infections respond to cleansing, moist dressings, and the treatment of redudant granulation tissue with silver nitrate. If the infection has spread to the hypogastric arteries with abscess formation incision and drainage is done as the drainage through the open ends of the vessels is inadequate. Secondary metastatic lesions with septicæmia are treated as indicated.

Fifty-one cases were admitted with omphalitis over a ten-year period. Thirty-three cases were fatal. The importance of examining the umbilicus in any infant with an unexplained septic process is brought out by the fact that in four of these fatal cases the omphalitis was unsuspected clinically.

ALAN ROSS

Generalized Lipoidosis in a Case of Amaurotic Familial Idiocy. Davison, C. and Jacobson, S. A., *Am. J. Dis. Child.*, 1936, **52**: 345.

Amaurotic familial idiocy is considered by most authors to be a disease resulting from a disturbance in the phospholipoid metabolism. In contrast to Niemann-Pick's disease in which there is a generalized lipoid histiocytosis striking visceral changes have not been demonstrated in amaurotic idiocy. In the case reported by the authors the condition was in all respects characteristic of the infantile type of amaurotic idiocy, but the patient showed in addition to the typical changes in the nervous system, deposits of lipoid in the viscera. They thus suggest that amaurotic idiocy and Niemann-Pick's disease have a common pathogenic factor, namely, a disturbance in the metabolism of the phosphatides and neutral fat. The case occurred in a child whose parents were Jews and first cousins. He was the second child in the family, the first having been a normal boy.

MADGE THURLOW MACKLIN

Familial Congenital Adrenal Syndrome. Jacobziner, H. and Gorfinkel, A., *Am. J. Dis. Child.*, 1936, **52**: 308.

The authors review the literature on pseudohermaphroditism and tumours of the adrenal cortex. They report 3 additional cases occurring in the only three children of normal parents. The oldest was a boy, the two younger patients were girls. There was marked hypertrophy of the genitals; male distribution of the pubic hair in all three; there was evidence of accelerated growth, as shown by the height of the children and the early age at which they acquired their full quota of teeth. They were dull mentally. Although no operative proof was obtained of the presence of a tumour in the

adrenal, the authors conclude that the features in their cases are indicative of an involvement of the adrenals rather than of the pituitary, the ovaries or testes, or the pineal. They state that a tumour need not always be present in the adrenal, nor need the gland be hypertrophied, but the change may be a qualitative rather than a quantitative one in the cells of the adrenal cortex. They advise a unilateral adrenalectomy at the time of puberty in girls, since it is in them that evidences of sex reversal occur.

MADGE THURLOW MACKLIN

Ophthalmology

Subjective Ocular Disturbances Following Cranial Traumas. Aubineau, *Ann. d'Ocul.*, 1936, **173**: 205.

The cranial traumas which are here described consist mostly of automobile accidents in 21 persons where there was more or less prolonged unconsciousness and no open wound. There have been seen injury of the optic nerve (1 case), isolated paralysis (2 cases), associated movements (2 cases). The patients all had subjective ocular disturbances, which are to be stressed from the morphological and medico-legal point of view.

All cranial traumas should be submitted to a complete neuro-ocular examination. Craniocerebral injuries may present objective ocular disturbances and subjective ocular manifestations. The subjective symptoms, identical in themselves, and distinct from psycho-neurotic troubles, seem to accompany in a constant manner "the closed cranial traumas, with loss of consciousness". These have an organic foundation, imperfect but real, which necessitates a reserved prognosis. From the medico-legal point of view, the objective ocular symptoms, draw on the part of the ophthalmologist "special conclusions". The ocular disturbances called "subjective" should on the contrary be looked upon from the point of view of "commotional syndrome" which are one of its manifestations.

S. HANFORD MCKEE

Concerning Accommodative Asthenopia Following Head Injury. Wescott, V., *Am. J. Ophthal.*, 1936, **19**: 385.

The annoyance and fatigue which many patients experience in reading following head injuries are not due in most cases to a loss of accommodation. The presence of skull fracture in head injury is not so important as the actual injury of brain tissue. Seventy-two patients who had sustained head injuries were examined by Wescott, and of this number 65 per cent had an accommodative power within normal limits for their ages, as defined by Duane. Five had been examined previously, of whom 2 had a subnormal accommodation before injury and 3 had a normal accommodation before and after injury. Wescott concludes from the study of these 72 cases that loss of accommodation following head injury has nothing to do with the discomfort in reading so often complained of, but rather that there has been some disturbance in the organization of the function of reading.

S. HANFORD MCKEE

Urology

Acute Suppurative Thrombophlebitis of the Renal Vein. Hyman, A., *J. Urol.*, 1936, **36**: 196.

The author regards the recognition of this condition, in the majority of cases, only as a presumptive diagnosis. This can only be made really by a process of exclusion. Since this condition is nearly always secondary to a suppurative lesion in the kidney, the diagnostic criteria are not sufficiently clear-cut to differentiate the thrombophlebitis from the primary kidney disease, the latter being cortical abscess of the kidney in 5 cases reported. The clinical picture is essentially one of sepsis with or without a bacteriæmia. The author believes that once venous involvement takes place the sepsis is of a more virulent type and the bacteriæmia appears to be more marked. If sepsis is not controlled after adequate drainage of a suppurative focus in the kidney, or after nephrectomy, thrombophlebitis of the renal vein should be suspected. It is advisable, if after a primary nephrectomy the sepsis persists, that the renal vein should be suspected and explored.

Six cases of suppurative disease of the kidney complicated by thrombophlebitis in five instances are reported. In 3 of the 5 cases the thrombotic process had already extended into the vena cava at the time of nephrectomy. In two instances thrombophlebitis was present without any recognizable gross changes in the vein. It is evident that suppurative lesions of the kidney act as a source of blood stream invasion by the production of a secondary thrombophlebitis. The mortality of this condition is unusually high, because the sepsis is so wide spread before the nature of the disease is recognized.

J. V. BERRY

The Gonadotropic Factor as an Aid to Surgery in the Treatment of the Undescended Testicle. Deming, C., *J. Urol.*, 1936, **36**: 274.

The recognition of the part played by hormones in the treatment of the undescended testicle is being catapulted into the realms of surgery. The author states that in man 2 per cent are born with undescended testicles, and that in adult life this percentage drops to 0.1. It is agreed that pubescence, with its multiplicity of glandular secretions, activates the processes producing testicular descent. It has been possible to demonstrate hormones with active gonadal principles from the blood and urine of the newborn up to the fourth or sixth days.

This is evidenced by the increase in the interstitial tissue of the testicle during the ninth lunar month, and the swelling and œdema of the external genitalia of the newborn.

The author reports his experimental work with the use of gonadotropic principle in preadolescent macaque monkeys, and was able to verify the work of Engel. Histological study was made of the tissues before and after each course of treatment. The changes that were noted consisted mainly of an increase in the diameter of the tubules and interstitial tissue of the testis. The tubules of the epididymis were larger, the vas was enlarged two to three times, the vascularity of the cord was increased, and an increase in the size of the lymph spaces was noted. Therefore, by the use of the gondotropic principle descent of the undescended testicle is brought about by enlarging the inguinal canal, elongating all of the cord structures, and producing the development of the scrotum, thus fulfilling all the wishes of the surgeon. The gonadotropic principle is therefore a marked adjunct to surgery, as in some instances the surgical measures can be avoided, others can be made easier, and still more can be made successful by its post-operative administration. The usual dosage employed, is 0.4 to 1 c.c. intramuscularily every other day for a month, and treatment may be commenced as early as the second year of life.

J. V. BERRY

Neurology and Psychiatry

Subdural Traction and Post-Traumatic Headache: Study of Pathology and Therapeusis. Penfield, W. and Norcoss, N. C., *Arch. Neurol. & Psychiat.*, 1936, **36**: 75.

Observations of patients during operations under local anæsthesia have shown that the only type of sensation which can be experimentally produced within the cranial cavity is interpreted by the subject as pain or pressure. Practically the only sensitive structures appear to lie within the dura in association with the major meningeal arteries and the dural sinuses. This suggests that the intracranial structure which is chiefly concerned in the production of post-traumatic headache is the dura. Typical post-traumatic headache is constant, and is localized as a rule to the vicinity of the point at which the head is stuck, except that when the blow is over the occiput the pain is often complained of in the frontal region. The authors from clinical and experimental evidence have concluded that the lesion responsible for this headache is situated in the subdural space; that adhesion of the arachnoidea to the dura causes constant traction or pressure on a sensitive area in the under surface of the dura. Separation of these adhesions may be effected by insufflation of air into the subdural space, a therapeutic procedure which has given very satisfactory results. When intraspinal insufflation is performed the patient is placed in a posture which will allow air to enter the subarachnoid space but not the ventricles. In successful cases, within 24 hours, oscillation of the head results in rupture of the arachnoid membrane and passage of a large amount of air out into the subdural space. It appears that rupture of the arachnoid is more apt to occur when it is adherent to the dura. If this method is not effective direct intracranial subdural insufflation may be performed. The dura is opened at the site of the headache through a small trephine hole. A lumbar puncture is then performed to empty the ventricles, which results in the aspiration of air into the subdural space.

FRANK TURNBULL

Multiple Metastatic Tumours in the Brain arising from Primary Bronchial Carcinoma. Dickson, W. E. N. and Worster-Drought, C., *J. Neurol. & Psychopath.*, 1936, **16**: 289.

The frequency of primary bronchial carcinoma has increased remarkably during the past ten years. A very high percentage of these carcinomas produce multiple metastases in the brain. The 14 such cases herein reported illustrate the tendency, particularly in male patients, for the bronchial symptoms to remain latent, while the cerebral symptoms dominate the clinical picture. In the brain metastases are liable to occur, especially in the frontal and temporosphenoidal lobes and in the cerebellum. A typical histological feature of bronchogenic carcinoma is its papillomatous structure. Secondary tumours occur frequently in the choroid plexus. Many cases in which this has occurred have been described erroneously as examples of malignant papilloma of the choroid plexus. Cysts often develop in connection with the cerebral metastases. It is usually possible to detect mucin in the aspirated content of these cysts, and occasionally fresh wet films may demonstrate malignant epithelial cells. The authors agree with Bailey that primary bronchogenic carcinoma should always be looked for in any patient of middle age, or beyond, who develops rather rapidly symptoms of an infiltrating tumour of the brain, especially if the signs of intracranial tension are not marked or there is pronounced mental confusion. These patients should have a careful examination of the chest, including a roentgenogram, whether pulmonary symptoms are present or not.

FRANK TURNBULL

Dermatology

Focal Infection in Dermatology. Ayres, S., Jr. and Anderson, N. P., *Arch. Dermat. & Syph.*, 1936, **34**: 421.

In this paper the authors invite special attention to the rôle of focal infection in skin diseases, somewhat neglected if not discredited hitherto, and discuss some of the newer concepts in this

connection. The many areas in which infectious foci may be located are listed, and include such generally recognized ones as the teeth, tonsils and accessory sinuses, and also the bones, genito-urinary and lower respiratory tract as well as the skin itself. Methods of detecting many of these foci are briefly mentioned.

The diagnostic methods to be employed are well discussed, and the pitfalls which may be encountered are emphasized. The statement that "hasty and careless assumption of cause and effect on the basis of inadequate evidence tends to discredit the theory of focal infection, subjects the patient to unnecessary surgical procedure, and may obscure a more obvious cause of the eruption in question" is worth serious consideration. A list of 34 cutaneous disorders which clinical experience or recent investigation place in the category of those in which foci of infection may be the sole or a contributing cause is given.

An excellent summary of systemic treatment will be found. In view of the popular vogue for natural and artificial ultra-violet therapy which is widespread among both laity and the medical profession we might draw attention with special emphasis to the remark, under the heading of general measures to build resistance: "Ultra-violet irradiation and sun-baths are usually contraindicated, since focal infection tends to produce photo-sensitivity in most cases".

D. E. H. CLEVELAND

Mapharsen in Mass Treatment of Syphilis in a Clinic for Venereal Diseases. Gruzhit, O. M. *et al., Arch. Derm. & Syph.*, 1936, **34**: 432.

In this study, carried out by the author and his associates in the Detroit Department of Health, 4,841 patients with syphilis were given a total of 75,589 injections. The sexes were about equally represented. The treatment consisted of courses of eight weekly injections of mapharsen, alternating with courses of eight weeks of treatment with a heavy metal, continuing without a rest period until three courses of mapharsen and three courses of heavy metal were completed. No severe complications or death occurred. Moderately severe reactions necessitating discontinuance of treatment occurred 4.4 times per 1,000 injections. These were preponderatingly associated with gastro-intestinal disturbance. Spirochætes disappeared from moist lesions within from 24 to 48 hours after the initial dose of 0.04 g. and lesions healed more rapidly than similar lesions under neoarsphenamine therapy.

D. E. H. CLEVELAND

Therapeutics

The Injection Treatment of Hernia. Harris, F. I. and White, A. S., *Surg., Gyn. & Obst.*, 1936, **63**: 201.

In an attempt to evaluate the injection treatment of hernia the authors decided to make a study based on experimental and clinical evidence. This paper is presented as a preliminary report based upon 100 cases treated since early in 1934. Well over 1,000 injections were given.

This report is concerned only with the treatment of completely reducible indirect and direct inguinal and "recurrent" inguinal hernias. They have follow-ups on 1 case for 11 months, 1 for 9 months, 2 for 8 months, 3 for 7 months, 4 for 6 months, 13 for 5 months, 4 for 4 months, 16 for 3 months, 16 for 2 months, 7 for 1 month, dating this time from the removal of the truss. Every one of the 67 patients has remained free from subjective and objective symptoms of insufficient treatment. They have not had any severe local or general reactions and each patient has been able to continue at his work.

In their experimental work the authors made use of the thigh muscles of guinea pigs. At varying lengths of time after injection, the thigh was removed and fixed in formalin. Sections were obtained and stained with hæmatoxylin and eosin and modified Masson's stain. The solution provoked an immediate polymorphonuclear leucocytic response of brief duration, followed by a mononuclear mesenchymal reaction which differentiated into spindle-cell fibroblasts. Injections made into the peritoneum produced only a very slight swelling of the mesothelial cells lining the peritoneum.

The authors base their conception of cure on the production of firm adhesions between the external oblique muscle and the underlying internal oblique and the transversalis fascia. The treatment should only be attempted by those conversant with the anatomy and surgery of the parts and familiar with the exact application of trusses. The injections used have as their basis tannic acid extracted from vegetable barks and dissolved in alcohol. Formula No. 1 has an alcoholic content of 98 per cent; the remaining 2 per cent include various amounts of six vegetable barks. Formula No. 2 is Pina-mestre solution and proliferol. The hernias must be kept completely reduced by a semi-rigid truss with a low posterior fulcrum, the pad covered with a waterproof material, worn day and night, for one week beforehand, during the treatment and for 4 weeks thereafter, and worn during the daytime for 4 to 6 months following. The patient is placed in the Trendelenburg position; the skin is properly prepared; a local anæsthetic of a 4 c.c. combination of novocaine 2 per cent, nupercaine, 1-1000, and benzyl alcohol 2 per cent in distilled water, injected posteriorly to the external oblique but anteriorly to the hernial sac. In the indirect hernias the injections are given from below upwards; in the direct they are used in the lower medial half of Hesselbach's triangle. One injection is given every second day.

The authors express their belief that the rejection of this method of treatment by many conservative surgeons is based upon their lack

of understanding or knowledge of the rationale of the new solutions. Treatment of umbilical, ventral and femoral hernias by this method will be described in a subsequent paper if results warrant its use. FRANK DORRANCE

Ambulatory Treatment of Fractures of the Neck of the Femur. Apfelbach, G. L. and Aries, L. J., *Surg., Gyn. & Obst.*, 1936, **63**: 341.

The authors report the results of treatment in 22 patients: 17 have bony union, 3 have failed, one because of carcinoma elsewhere, and 2 because of failure to comply with orders.

The treatment began with Buck's extension (skin traction) until recuperation from the trauma had taken place, usually after 5 to 6 days. The patient, placed in a stockinette fabric, is anæsthetized with ether on a Hawley table. Whitman's closed reduction is performed with the injured limb in extension, 30 degrees abduction, and inverted to such an extent that the lesser trochanter does not show in an anteroposterior x-ray. The fragments are impacted, using 4 or 5 blows in the axis of the neck of the femur over the saddler felt-covered greater trochanter (Cotton method). A snugly fitting plaster cast is applied from the toes on the affected side to the sixth rib on the opposite side. All bony prominences are padded with sheet wadding and felt, and great care is used to mould the cast snugly to the contour of the pelvis, and particularly between the greater trochanter and the crest of the ilium on the injured side. A metal walking iron is incorporated. The pelvis is tilted so that the injured extremity is nearly perpendicular. An inexpensive light weight shoe-elevation, composed of several layers of celotex covered with a thin rubber matting, is clamped to the shoe on the uninjured side. This method prevents a coxa vara deformity, immobilizes one limb only, reduces hospitalization to about 30 days, and gives happier patients. In such a position walking gives repeated impaction in the axis of the neck of the femur, and stimulates healing. Walking with crutches commences 48 hours after reduction. FRANK DORRANCE

Pathology and Experimental Medicine

Medullary Tumour of the Adrenal Glands with Hypertension and Juvenile Arteriosclerosis. Kremer, D. N., *Arch. Int. Med.*, 1936, **57**: 999.

From a rather confused conception of the part played by tumours of the adrenal glands has grown the theory that they cause hypertension which may not be recognized early in the condition because of its paroxysmal or recurring character. Surgery is successful if undertaken early enough.

A case is reported, diagnosed as hypertensive heart disease with glomerular nephritis, in which medullary tumours in each adrenal gland were found at autopsy. The patient a girl of 14, had been in hospital several times over a period of six years, at first complaining mostly of attacks of coughing with some shortness of breath, later admitted in a stupor with generalized œdema, and finally dying of pulmonary œdema associated with very high blood pressure, cardiorenal failure and cerebral thrombosis. Both adrenals showed a thinned-out cortex and the medullæ largely occupied by tumours of the paraganglioma type.

There was some evidence of glandular dysfunction in the distribution of hair and fat and lack of full sex development. The pituitary possibly was affected by the adrenals. There are good grounds for believing that the adrenal tumours were the pathological features in this case.

P. M. MACDONNELL

The Experimental Induction of Erythema Nodosum. Coburn, A. F. and Moore, L. V., *J. Clin. Investigation*, 1936, **15**: 509.

The syndrome of erythema nodosum is known to be associated with a number of diseases. The nodules are strikingly similar both in their gross and microscopic appearance, irrespective of the causal infection. This suggests that these lesions result from a common underlying mechanism.

Twenty-two patients with erythema nodosum were observed by the authors. Two of these had x-ray evidence of pulmonary tuberculosis, reacted strongly to tuberculin, were negative to hæmolytic streptococcus nucleoprotein, and had normal antistreptolysin titres. The other 20 reacted strongly to hæmolytic streptococcus nucleoprotein, weakly or not at all to tuberculin, and had elevated antistreptolysin titres, varying from 125 to 2500 units, with an average of 500. Twelve patients who had been examined in detail are discussed, eleven girls or young women and one boy. All had recent or subsiding erythema nodosum on both legs, asymmetrically distributed, and all had high antistreptolysin titres. All were given hæmolytic streptococcus mucleoprotein intracutaneously on the volar surface of the forearm. Some were given in addition hæmolytic staphylococcus, pneumococcus 1, Pfeiffer's bacillus, and *M. catarrhalis*. All doses were standardized to contain 0.001 mg. of nitrogen. The authors found that the intracutaneous injection of the appropriate antigen in a patient with subsiding erythema nodosum was regularly followed by an intense inflammatory reaction at the site of injection. This local reaction was followed in half the subjects tested by a recrudescence of the erythema in the areas recently affected. The capacity of the involved extremities to develop erythema persisted for only a few weeks. These findings suggest the following hypotheses. In the course of certain infections symmetrical areas of the body become conditioned for a few weeks. Intense localized inflammation, presumably the result of specific antigen-antibody reaction, liberates some sub-

stance into the circulation, which induces non-specific nodular lesions in the conditioned zones at a distance from the localized inflammatory reaction. This view is consistent with Topley's conception of "secondary effects of primary cellular reactions". JOHN NICHOLLS

Variations in Serum Calcium and Phosphorus during Pregnancy. IV. Effect on the Body Stores as shown by the Ash of Rats. Mull, J. W., *J. Clin. Investigation,* 1936, **15**: 515.

Pregnant rats show a fall in serum calcium near the end of gestation averaging 12 per cent from the figure in non-pregnant controls. This was not found in the newly delivered rats or at the end of nursing. The calcium and phosphorus per g. of body weight, as determined from the ash of the entire carcass, showed a 6 per cent loss near the end of gestation as compared with the non-pregnant controls. Newly delivered rats and those nursing their young to weaning did not show such a loss. The fall in serum calcium and phosphorus is an indication of the depletion of the body stores, as determined from an analysis of the ash. The analogous fall in the human female during pregnancy can therefore also be taken as an indication of the depletion of the mineral stores of the body. Newborn rats showed a much lower calcium and phosphorus content per g. of body weight than the adults and an entirely different calcium-phosphorus ratio (2,2/2.7 mg. per g. of body weight, as compared with 11/7 in adults). JOHN NICHOLLS

Hygiene and Public Health

A New Procedure for the Control of Benzene Exposure. Schrenk, H. H., Yant, W. P. and Sayers, R. R., *J. Am. M. Ass.,* 1936, **107**: 849.

In the control of benzene poisoning industrially the usual procedures are to analyze the air of the workshop and to examine the workers themselves for evidence of anæmia and leukopenia. The first procedure is subject to errors in interpretation because of the great variation from hour to hour in the concentration of benzene vapours. The second procedure is not entirely satisfactory since clinical evidence of benzene poisoning may not appear until some damage has already been done to the individual.

The authors describe a new method for indicating benzene absorption much earlier than blood changes will do, and which can be applied without difficulty. The relative proportion of inorganic sulphates in the urine to organic sulphates is nominally very high, usually over 85 per cent. In benzene absorption this percentage is reduced apparently in direct proportion the severity of exposure. Experiments on dogs are described and studies of individuals actually exposed to benzene vapours in their work. The results of these studies support the authors' claims consistently. FRANK G. PEDLEY

Obituaries

Dr. Arthur Dalton Smith

AN APPRECIATION

On August 30, 1936, Dr. Arthur Dalton Smith turned his face to the everlasting shadow. Two years more than half a century ago he graduated from Trinity Medical College and began to practise at Parkhill, Ont. Born nearby, in Lambton County, he was educated at Watford, and then, following the custom of those days, he taught in a country school till he had earned money enough to enter college.

In 1887 he moved to Mitchell, where he spent the rest of his life. To few men is it given to enjoy in such a large measure the confidence and love of an entire neighbourhood. In this modern mechanized age of specialism it is hardly possible that the physician will ever again play the part he did in the last half of the nineteenth century. Here in this quiet, pastoral community Dr. Smith entered into every phase of its public life. For forty years he was a member of the school board, half of that time its chairman. He took an active part in all sports and was president of the golf, bowling and tennis clubs at various times, playing all these games till quite recently. He was also deeply interested in church work and in Masonry, holding high office in each. His love of flowers brought him many friends among the elect, and his beautiful "winter garden" in his office window on Main Street will long be remembered.

But it was of course his life work in medicine that was most distinctive. From his earliest days in Mitchell he had a well-deserved reputation for surgical skill which called him many times to the lonely farmstead where the pioneer settler was clearing away the forest. As he reached the Olympic perspective and serenity of mellow years his advice was constantly sought by his colleagues, who appreciated his intuitive sense of right values and reality. Among his patients his great humanity and kindliness helped many a traveller up the steep sides of Calvary, and his wise admonition strengthened many a life of quiet desperation.

In 1916 he was elected president of the Ontario Medical Association. Those who listened to his scholarly address at the annual meeting will never forget his words which were delivered with all the charm of a finished orator. Ever since his term of office he took an active interest in the affairs of the Association, and it was in no small measure due to his efforts that the district in which he lived was so well organized.

Always in Committee or at the bedside he was the "gentleman of the old school" with whom politeness was inborn. Throughout the years he kept alive his love of life's great simplicities. He felt with Montaigne the rare delight of dividing his life between the solace afforded him by nature and the stimulus offered by man.

His friends will miss his blithe enthusiasm and his friendly smile, but "his name shall smell sweet with the myrrh of remembrance and chime melodiously in the ear of the future". F. ARNOLD CLARKSON

Dr. Wilfred Lorne Atkinson died at his home in Selkirk, Man., on September 15, 1936, at the age of fifty. He was born at Clearwater, Man., and graduated in medicine from Manitoba University in 1911. He practised for nearly twenty-five years in Selkirk and took a leading part in the life of the community, especially in the formation of the Selkirk Golf Club. After the war he served for a time on the staff of the Tuxedo Hospital. A heart condition crippled him during the last two years of his life, and to seek relief he took a long sea voyage about two years ago. He is survived by his widow, one brother and three sisters.

Dr. George Whitman Bailey, of Fredericton, N.B., died at his home on September 21, 1936. He was 57 years of age and had not been in good health for some months.

Dr. Bailey was born in Fredericton in 1879, a son of the late Professor Loring Bailey, of the University of New Brunswick, and was educated in Fredericton schools, the University of New Brunswick and McGill University. He graduated in medicine in 1907. He had practised in Saint Martin's and Fredericton Junction and joined the Department of Health staff in 1922. At the time of his death he was medical inspector of schools and Assistant District Medical Health Officer.

Dr. Bailey, following the example of his father, the late L. W. Bailey, F.R.S.C., and of his grandfather, Marshall the Baron d'Avray, took an active interest in historical, geographical, and natural history subjects. He also had one of the best collections of photographs of New Brunswick scenery. He was one of the founders of the York and Sunbury Historical Society and took an active interest in its welfare. He was a member of the A. & B. Club in Fredericton. He was a former demonstrator in botany at McGill University. He was a past president of the Fredericton Science Club, a member of the Natural History Society of New Brunswick and a Fellow of the American Geological Society of New York.

In 1908, Dr. Bailey was married at Montreal to Gwendolyn Eunice S. Dyer, a daughter of Mr. and Mrs. William A. Dyer of that city. He is survived by Mrs. Bailey and by one daughter, Doris Marie d'Avray, wife of Rev. Edgar M. Baird, Popular River, Manitoba; and one son, Reginald W. Bailey. Two brothers, Baron d'Avray, of Quebec, and Henry, of Halifax, and two sisters, Mrs. West and Miss Laurenstine Bailey, of Halifax, also survive.

Dr. Duncan Alexander Campbell, of Bridgewater, N.S., died suddenly at his home on the first day of September, 1936. He was thirty-nine years of age. A native of Halifax, Dr. Campbell was one of the most prominent men on the south shore of Nova Scotia. He served as pathologist to the Dawson Memorial Hospital during the past twelve years, as coroner, and carried on a large general practice. He was active in his local and provincial medical societies and an enthusiastic member of the social life of his community. He attended St. Mary's College and graduated from Dalhousie University in medicine in 1922. In 1924 he married Miss Rachael Hagen, of Halifax. Surviving him are his wife and three young sons, Duncan, John and Robert.

Dr. Frederick J. Cawthorpe, of Tavistock, Ont., died on September 27, 1936, in his sixty-third year. He was a son of the late Mr. and Mrs. Joseph Cawthorpe, and was a graduate of the University of Toronto (1898). He had practised for twenty-nine years as a general practitioner. He is survived by his widow, Jean Dick, and two sons, Robert and Joseph.

Dr. William Filmer Coy, of Vancouver, died on September 17, 1936. Dr. Coy came to Vancouver in 1903 after practising for ten years in Chicago. He served overseas with the Canadian Army Medical Corps and afterward became a member of the consulting staff at the General Hospital. He was a past-president of the Vancouver Medical Association.

He is survived by his widow and a son, Dr. Filmer E. Coy, of Windermere.

Dr. Frederick Morley Fry, of Montreal, died on September 18, 1936, in his sixty-seventh year. He was a graduate of McGill University, in Arts (1890) and in Medicine (1894).

Dr. Fry was born in Quebec and came to Montreal with his parents when he was five years of age. He attended the Montreal High School and McGill University. During his undergraduate days he was keenly interested in all field sports and was also a strong supporter of the Glee Club.

After graduating he travelled in Europe for a year, devoting special attention to European clinics for children, and on returning to Montreal opened a general practice and became chief of the department of pædiatrics at the Royal Victoria Hospital, which position he held for many years. He was also a Lecturer on his specialty at McGill University. Dr. Fry was a member of the Kanawaki Golf Club and of the University Club.

The problem of the sick and poor children was one in which Dr. Fry was intensely interested, and he was always to the forefront in anything that would benefit them. He was instrumental in the opening of the first milk station in Montreal, and continued it for some time, until lack of funds forced its closing. Later on several other milk stations were opened largely through the continuous interest that Dr. Fry took in this important field, and he was instrumental in organizing the Milk Commission, which sought to improve the purity and quality of the milk brought into the city, especially that distributed in the poorer sections, and for several years he acted as its secretary-treasurer.

Dr. Fry is survived by his wife, formerly Edith Waldock; his brother, A. D. Fry; three stepdaughters, Mrs. John Pratt, Mrs. Paul Williamson, and Mrs. Bertram Taylor.

Lieut.-Colonel James Alexander Grant, a well-known figure in military and medical circles, died at Banff, Alta., on September 19, 1936, in his eightieth year.

The eldest of twelve children, Colonel Grant was born in Ottawa in September, 1857. Following in the footsteps of his distinguished father, the late Sir James A. Grant, K.C.M.G., 10th chief of the Grants of Corrimony, Scotland, and his paternal grandfather, the late Dr. James Grant, ninth chief, he joined the medical profession, graduating from McGill University in 1882. He took the L.R.C.P.(Lond.) in 1883.

Two years later he participated in one of the military events responsible for western Canada being retained for the British Crown, proceeding to Fort Garry (Winnipeg) with the force which subdued the Northwest Rebellion, and captured Louis Riel, the half-breed who instigated the Red River Rebellion of 1870 and returned fifteen years later from the United States to lead a second revolt against the encroachment of white men on the prairie wilderness, where the buffalo roamed. Colonel Grant was popularly known at that time to his fellow-officers as "Medicine Hat", by reason of the busbies then worn by the troops, though it is not known whether this or a similar incident was responsible for the name now held by one of the prosperous communities of Alberta.

After some time in practice in Ottawa, Lieut.-Colonel Grant joined the R.C.A.M. corps, and served with distinction during the Great War with the first Canadian Contingent. He was stationed at various times at Victoria, Halifax, Ottawa and Toronto.

Recent years had been spent in retirement under the shadow of the Canadian Rockies, which he first saw fifty years ago, resident at Banff, where he was highly respected.

Colonel Grant is survived by his widow, Lucie, daughter of the late Hon. John Macdonald, of Toronto; one son, Alan; two daughters, Nan, wife of Lieut.-Colonel Keene Heming, and Helen Grant, all resident in Banff; two brothers, E. C. Grant, of Ottawa, and W. W. Grant, of Geneva, N.Y.; and three sisters, Mrs. G. R. Major and Miss Harriet Grant, of Ottawa, and Mrs. Alister Mitchell, of Montreal.

Dr. Gaspard L. Marsolais, of St. Eustache, Man., died at St. Boniface Hospital on September 14, 1936. He was born at Joliette, Que., in 1873, and came to Manitoba as a youth of nineteen. Graduating in medicine, he returned to St. Eustache where he became medical health officer for the municipality. A widow and son survive him.

Dr. John Herbert McConnell, of Toronto, died suddenly on September 15, 1936, in his sixty-second year. He was a graduate of Trinity University (1897). Dr. McConnell was a son of the late Dr. John McConnell, and received his primary education in the public schools, Upper Canada College and Trinity University. He was an active member of Trinity College Corporation. He was also a past-president of the Æsculapian Club. He had practised in Toronto ever since his graduation. He was a former president of the Academy of Medicine, former senior surgeon on the staff of Grace Hospital and on the surgical staff of the Western Hospital and a Fellow of the American College of Surgeons. He had an extensive practice in the western section of the city. He is survived by his widow, Frances Lister McConnell, and several brothers and sisters.

Dr. Duncan Alexander McPherson, of Toronto, died suddenly on September 21, 1936, at his home at the age of 81 years. He was a graduate of Trinity University (1892). For some time he was on the staff of the General Hospital. He is survived by his widow, Emma H. Johnston, and a daughter, Mrs. Courtland H. Peaker.

Dr. Edward Reginald Secord. It is with regret that we have to announce the death of a prominent surgeon, and past-president of the Ontario Medical Association—Dr. E. R. Secord.

Dr. Secord was born in Bright, Ontario, on May 27, 1879, a son of the late Dr. Levi Secord. The family two years later moved to Brantford, Ont., where his father practised for many years.

Dr. Secord entered as a student at McGill University in 1896 and he graduated as Gold Medallist in 1900. Following his graduation he spent two years on the staff of the Montreal General Hospital and then commenced practice in Brantford. For many years he specialized in surgery and radiology, in both of which he was recognized as an authority. He was a Charter Fellow of the Royal College of Physicians and Surgeons of Canada, and a Fellow of the American College of Surgeons. He was President of the Ontario Medical Association in 1922; a Past Master and life-member of Doric Lodge, A.F. & A.M., and a member of the Scottish Rite, and at one time High Court Medical Examiner of the A.O.F.

He is survived by his widow, formerly Miss Alice Tapscott, and one brother, Arthur O. Secord, Detroit. Another brother, Dr. W. Herbert Secord, a prominent surgeon of Winnipeg, passed away only last May.

Dr. Jon Stefansson died in the Winnipeg General Hospital on September 29, 1936, of pneumonia. He had been present at a celebration at Gimli on September 19th when Lord Tweedsmuir visited the pioneer Icelandic settlement, but was stricken down a day or two later. His name was internationally known for his operation for the relief of glaucoma. He was born in Iceland in 1878, and at the age of ten came to Manitoba with his father who settled on a farm at Cypress River. He was educated at Wesley College and the Manitoba Medical College. After an apprenticeship with the late Dr. S. W. Prowse, he spent two years in study in London, Glasgow, Vienna and Berlin, narrowly escaping internment at the outbreak of the Great War. Returning to Winnipeg, he carried on practice in diseases of the eye, ear, nose and throat. He took a keen interest in the welfare of his Icelandic countrymen, read widely, and delighted in music. His wife, Joanna Philipowska, a Russian opera singer, predeceased him, but he is survived by a son and daughter.

Dr. Robert Stirton Thornton, aged seventy-three, died at Vancouver on September 18th. Although the last five years of his life was spent on the Pacific coast, his active life was lived in Manitoba, and on account of his position in the legislature and in the Masonic craft he was almost as well known in Winnipeg as in Deloraine where he practised from 1887-1931. He was born at Edinburgh in 1863, was educated at Herriot's College and the University of Edinburgh, and started practice shortly after graduation at Deloraine, at a time when settlers were crowding into southern Manitoba. He was chairman of the School Board at Deloraine for some years, and was a prime mover in establishing the park there which is so well known to visitors. In 1911 he was elected to the Manitoba Legislature, was defeated in 1914, but was again returned in 1918, when he served as Minister of Education in the Norris Government. In this capacity he did much to unify education and to stamp out multilingualism. He planned to make the school a community centre. In 1914 he was elected president of the Medical Council of Canada, succeeding Sir Thomas Roddick. In his presidency a Dominion-wide license to practice was obtained. Queen's University honoured him with the LL.D. in 1914.

The death of his wife following a motor accident five years ago in which he, himself, was severely injured, affected him greatly.

A man of kindly and congenial disposition, a skilful physician, and a statesman of clear vision, Dr. Thornton set his mark on the Canadian West.

Dr. Joseph D. Vilandre died on October 2, 1936. He was born in 1878 at Wotton, Que., and was educated at the Quebec Seminary and at the Montreal College. He obtained his medical degree at the age of 22 from Laval University Medical School at Montreal, now part of the University of Montreal, and passed his internship at the Hôtel-Dieu Hospital. He practised in the Eastern Townships and later went to Mexico, where he was surgeon-in-chief of the military hospital at Sierra Mojada. On his return from Mexico he was medical superintendent at the Grand Sanatorium, Norwich, Conn., for two years.

Dr. Vilandre then took up practice in La Tuque, Que., where during the "Spanish flu" epidemic of 1918 he organized an emergency hospital and instituted a civic sanitary body and the regular health inspection of schools. In 1922 he spent a year in France and recently had worked in Ste. Cécile parish as a doctor of the Infant Hygiene Federation and been associated with the l'Assistance Maternelle.

He is survived by his widow, Mme. Adrienne Roy-Vilandre, a Montreal singer noted for her interpretation of Indian, French and Canadian folklore; two daughters, Rolande and Michelle; two sons, Adrien and Gilles; and two brothers, J. I. Vilandre, of Montreal, and Oscar Vilandre, of Boneyville, Alta.

Dr. Thomas Albert Watterson, of Manotick, Ont., died on September 3, 1936. He was sixty-one years old and a graduate of the University of Toronto (1904).

Dr. Watterson was a son of the late Gabriel Watterson, and his wife, Sarah Jane Kidd, and was born near Manotick on January 16, 1875. He received his education at public schools at his home, and at Ottawa Collegiate Institute. He attended the University of Toronto, and graduated in medicine with honours in the class of 1904. Dr. Watterson com-

6 YEARS

In 1930, when Emmenin was first announced by Dr. J. B. Collip as an orally-active water-soluble hormone of the placenta, little was known of the chemical nature of placental oestrogenic substances or of the important part they are now known to play in endocrinology.

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menced practice in Ottawa with the late Dr. Thomas Potter.

Active in military circles for many years, Dr. Watterson joined the old 43rd Regiment in 1896. He enlisted during the Great War in the Canadian Army Medical Corps in June, 1916, as a private, and became a lieutenant-colonel. He was stationed in England at Shorncliffe Hospital at Folkestone, and at Kitchener Hospital, Brighton, and in France, at Etaples.

He returned to Canada in 1918, when he was for some time on the staff of the Camp Hill Hospital at Halifax, later being transferred to Ottawa as O.C. of the Fleming Home. He was a member of the staff of old St. Luke's Hospital, Ottawa, and later of the Civic Hospital. His Ottawa practice he resumed until a few years ago, when ill-health forced him to resign active work.

He is survived by his widow the former Jessie Grace Pallister, of Ottawa; two daughters, Mrs. Hans Hartvig Jorgensen, of Johannesburg, South Africa, and Miss Edith Watterson, of Ottawa; one son, Thomas Albert Watterson, with the Marine Section of the R.C.M.P., at Halifax; by two sisters, Mrs. David McNeil, of Carsonby, and Miss Gertrude Watterson, of Ottawa; and by two brothers, George and John, both of Manotick.

News Items

British Empire

Applications are invited from qualified medical practitioners, preferably about 40 years of age, for the position of Director of the Kanematsu Memorial Institute of Pathology, Sydney Hospital, N.S.W., at a salary of £1,500 per annum (Australian currency). The duties of the Director are mainly to devote his attention to some field of medical research, and also to exercise general supervision over the routine work of the Institute. Previous experience in research is essential.

Applications, with copies of published papers, should reach the Secretary, Sydney Hospital, Sydney, not later than January 31, 1937. The appointment will be for a period of seven years, and the successful applicant will be eligible for reappointment.

Further particulars can be obtained from the Dean of the Faculty of Medicine, University of Toronto, Toronto, Ont.

Alberta

At the annual meeting of the Canadian Medical Association, Alberta Division, held in Calgary, September 15, 1936, a new Constitution was adopted. In this constitution was a merger clause, to which some technical objection had been raised, on account of the merger with the Canadian Medical Association the previous year. It was claimed that the word "affiliation" in the old Constitution was not sufficiently comprehensive.

Under the new Constitution the Board of Representatives can initiate a "merger". And, if two-thirds of the members of this Board are in favour they can proceed to take a plebiscite from the profession at large. If two-thirds of those who vote favour the merger, the Board of Representatives has power to complete a merger on such terms as it deems equitable. The Board of Representatives has agreed to the principle and a plebiscite is being sent out to the profession.

An agreement has been reached between the Provincial Association and the Canadian Medical Association, whereby all resident members of the profession in the Province of Alberta are to receive the *Canadian Medical Association Journal*, together with the benefits of the Canadian Medical Association, without necessity of becoming members of the latter organization. Those, however, who wish to become members of the Canadian Medical Association will be accepted on request, without further fee.

The new Constitution of the Provincial Association has established some fourteen committees, corresponding as nearly as possible to similar committees in the Canadian Medical Association. While in some cases the Provincial Committee is a combination of two committees of the National Organization, yet every Committee of the National Body has a similar committee which will undertake provincially any phase of work that is being done nationally.

The Registrar reported the following deaths among the Alberta Registrants since the last meeting: Drs. C. A. Baragar, Edmonton; Michael Costello, Calgary; A. E. Cote, Falher; Samuel Douglas, Midale, Sask.; Charles F. L. Haszard, London, Eng.; Ernest A. Hunt, Calgary; J. E. Lovering, Lethbridge; Robert M. Lynn, Lethbridge; P. A. MacDonald, Edmonton; J. A. Neff, Victoria, B.C.; Robert C. Robinson, Calgary; William T. Rush, Vancouver, B.C.; William A. Simmers, Manville; William Duncan Smith, Edmonton; C. C. Tatham, Midland, Ont.; Robert Woods, Leduc.

The Honourable W. W. Cross, Minister of Health, was a speaker at the annual banquet, when he commended the profession for the wonderful way in which they responded to calls to help the needy during the lengthened period of depression. He observed, however, that a certain element of the community was apparently not satisfied with the treatment they received at the hands of the profession and thus went to cults with lesser training. He suggested that the members of the profession might broaden out in their work.

G. E. LEARMONTH

British Columbia

Sir James Barrett, President of the British Medical Association and Chancellor of the University of Melbourne, was the guest speaker at the luncheon which concluded the opening session of the Vancouver Medical Association Summer School on September 8th.

Sir James made an address which is considered by all who were privileged to hear it to be one of the most impressive and inspiring ever delivered before a meeting of the Association. The speech was reported at some length in the daily press and the headlines in the *Province* are particularly worthy of note, since they were so misleading as to recall the expression "The Inspired Make-up Man". They read as follows: "Endorses B.C. Health Plans—British Medical Head Favors Insurance". Anyone interested in reading further would learn however that Sir James' statements were far from supporting such a remark. He is reported as saying "Health Insurance is an ideal which must be protected. If approached wrongly, it may become troublesome . . . . Properly handled, however, and in non-political hands, it can be made very useful to humanity. If politics, however, are allowed to interfere, I don't know what will happen."

The *Victoria Daily Colonist* quotes Sir James Barrett as saying that "The British Columbia Act provides for Government regulation which the late Chief Justice of England as the 'new tyranny from which there is no appeal'." The *Colonist* goes on to state in an editorial comment: "The fight made by the medical profession against the present Health Act was on the ground that it contained many features which would make it unworkable. Sir James Barrett appears to take exactly the same position in his estimate of the legislation, for he believes that regulations governing the operation of such an Act should only be made after consultation with accredited representatives of the medical profession. The whole principle of insurance depends on the co-

Slight Symptoms . . . Serious Complications

A COLD in the head . . . nasal turgescence . . . affected sinuses . . . earache, mastoid infection, lung infection, arthritis, or systemic disease. During the fall and winter season when colds are so common, the combating of this series of developments is an acute problem for the private practitioner.

In no phase of preventive medicine is the service of the radiologist more important. With radiographs, pathology of the sinuses can be determined readily. This is a positive procedure, whereas there is danger in depending on subjective symptoms, for none may be evidenced even after the disease has reached an advanced state.

To prevent the serious complications common to sinus infection, you should consider every head cold a possible attack of sinusitis . . . Moreover, if a cough develops or discharge persists, refer the patient to your radiologist for his guidance.

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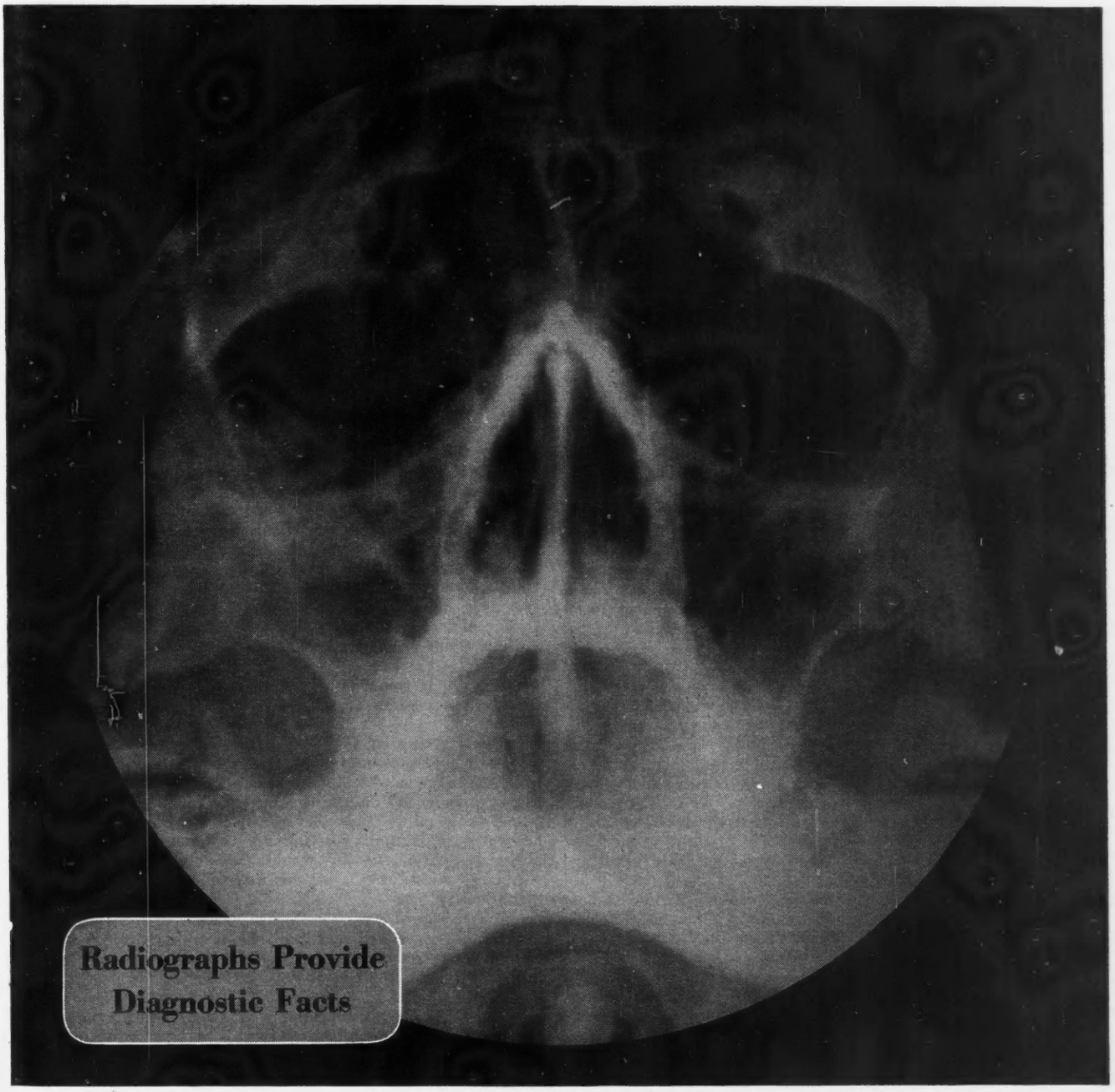

operation of the medical profession, and that body's advice in how it should be conducted is of the utmost importance to its success. This has been discovered in Great Britain and wherever else health insurance prevails. It will probably be found out in this Province as well, but not before many costly mistakes have been made.

"The scheme here is half-baked. It has been committed to partisan supervision. The provision for compulsion, with no appeal, indicates its mandatory character. It is bound to undergo many changes before it is acceptable to those most deeply concerned in it, and those people are not the Government which is putting it into force but those who will be taxed for health purposes."

Registration of some 110,000 employees in British Columbia for health insurance will start in September.

The Vancouver City Council has approved the principle of the Metropolitan Health Board and authorized Dr. J. W. McIntosh, Medical Health Officer, to proceed with arrangements to establish necessary machinery. Under this plan, approval of which is the result of nearly two years' work and campaigning on the part of Dr. McIntosh and some other lower mainland health authorities, it is proposed to amalgamate the health services of Vancouver and several adjacent municipalities and districts. The Rockefeller Institute has agreed to finance the plan over a five-year period, paying $20,000 for each of the first two years, $15,000 the third, $10,000 the fourth and $5,000 the fifth. The Provincial Government has agreed to watch these grants over an equal period. Work under the plan will commence October 1st, but the Board will probably be tried out for a year before a final act is framed to provide for it. Dr. McIntosh is appointed senior medical health officer for the Board, and will have under him an assistant medical health officer, four health unit directors, four clerks and eight nurses.

A link in what will eventually be a chain of first-aid stations along the Pacific and Interprovincial highways was opened recently by Viscountess Elibank, prominently associated with St. John of Jerusalem work in England. A first-aid kit was presented to a class of graduates in first-aid work. It will be always available at the service station at the corner of the Pacific Highway and the Johnston Road, the first post on the mainland.

The corner where the first-aid post has been established has been the scene of a number of accidents, although it is situated on a straight piece of road. Viscountess Elibank said that the location has been known as "Calamity Corner" but in future will be "Safety Corner".

The D. Appleton Century Company has written the British Columbia Medical Association stating that a salesman by the name of W. H. Patterson has been selling and collecting cash in the Company's name without authority from physicians in Alberta and is headed for Vancouver. Attempts to check his activities by the Company have so far failed. *Surgery, Gynæcology and Obstetrics* for whom he is also soliciting state that they are "taking steps to see that he is brought to account for the moneys he has collected and withheld covering subscriptions to our publication".

The Health Insurance Commission has established permanent offices in the Weiler Block in Victoria, which were occupied about October 10th.

The Crippled Children's Hospital, Vancouver, is sole beneficiary of a net estate of $9,708 left by Agnes Lucas, 1559 Beach Avenue, who died on September 2nd.

D. E. H. CLEVELAND

Manitoba

A meeting of the medical profession of Greater Winnipeg was held in the Medical College on September 18th under the auspices of the Winnipeg Medical Society, to discuss epidemic poliomyelitis now prevalent in Manitoba. Dr. Lennox G. Bell discussed the symptomatology and spoke of the epidemic of 1928. Dr. F. W. Jackson, Deputy Minister of Health, gave a general survey of the present situation. Dr. C. R. Donovan dealt with the epidemiology; Dr. M. R. Elliott spoke of the outbreak of the disease in Morton municipality; and Dr. F. W. Cadham discussed the value of convalescent serum. If the serum was given within thirty-six hours after onset of symptoms but before the appearance of paralysis the cures were practically 100 per cent, except for cases in which the bulb was involved from the beginning. The meeting was very well attended. It is hoped that the coming of cold weather will arrest the epidemic which at the time of writing is still prevalent.

The annual meeting of the Association of Officers of the Medical Services of Canada was held in the Fort Garry Hotel, Winnipeg, under the presidency of Dr. W. A. Gardner, Winnipeg, on October 2nd and 3rd. Lieut.-Col. R. M. Gorssline, D.S.O., D.M.O., M.D. No. 4, read a paper "The medical service with mechanized formations", and Lieut.-Col. F. A. Young, Winnipeg, a paper "The casualty clearing station". Prof. F. N. Fieldhouse gave the address at the President's luncheon, and J. W. Dafoe, LL.D., editor of the *Winnipeg Free Press*, addressed the gathering at the dinner on October 3rd.

ROSS MITCHELL

New Brunswick

Dr. S. R. D. Hewitt, Superintendent of the Saint John General Hospital, Saint John, is at present attending the meeting of the American Hospital Association at Cleveland.

Dr. E. A. Petrie, Radiologist at Saint Joseph's Hospital, Saint John, is attending the annual meeting of the American Roentgen Ray Society at Cleveland.

The New Brunswick Hospital Association held its annual meeting at Bathurst this year which was very well attended. One of the features of the convention was an address on "Hospitalization by municipalities", read by Mr. F. Lansdowne Belyea. Hon. Dr. W. F. Roberts, Minister of Health, was elected Honorary President for the coming year. Other physicians on the executive included Drs. J. J. McPherson, Campbellton; G. E. Govang, Bathurst; S. R. Hewitt, Saint John; R. J. Collins, Saint John; and P. H. Laporte, Edmundston.

Dr. Vernon Snow, Hampton, has completed a short post-graduate course at Montreal.

The meeting of the New Brunswick Association of Registered Nurses was held this year in Moncton, at which Miss A. J. McMaster presided. Miss McMaster in her presidential address stressed the fact that too few nurses were supporting the Association. She felt that necessary legislation relating to the position of the nurse in public health would be delayed until all registered nurses took a serious interest in the affairs of their Society.

Dr. K. A. Baird was the official representative of the New Brunswick Medical Society at the meeting of the Nova Scotia Medical Society in Halifax.

Dr. R. T. Hayes, of Saint John, was recently made a member of the American Academy of Ophthalmology and Oto-laryngology.

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Dr. Albert W. Clark, recently an assistant at the New Brunswick Provincial Hospital, Saint John, has established a practice at Sussex.

A. STANLEY KIRKLAND

Nova Scotia

Dr. J. G. MacDougall, of Halifax, has been elected a member of the Board of Governors of Dalhousie University. The medical profession has at present four representatives on this governing body. The others are: Drs. E. K. Maclellan and K. A. Mackenzie of Halifax, and Dr. Webster, of Shediac, New Brunswick.

On September 12th Dr. F. P. Smith, of Mill Village, celebrated his 87th birthday. He has been in practice there for the past forty-five years.

Word has been received from the Gold Coast, West Africa, of the death of Dr. John Denoon, who was serving as a member of the West African Medical Service. His work extended over an area of seven thousand square miles. He had in his charge two hospitals and five dispensaries at widely separated points. He began his studies at the University of Toronto and later he transferred to Dalhousie University where he received his medical degree. Earlier in this year he had paid a visit to Canada.

Dr. D. S. Sutherland, of Chester, has left for St. Kitts, B.W.I., to take up practice there. Before his departure he was tendered a banquet by his colleagues and members of the Masonic Order at their Lodge.

Dr. J. A. F. Young has settled at Scotsburn, where he has succeeded to the practice of Dr. MacLean who is retiring on account of ill health.

The death is reported at Burin, Nfld., of Dr. Arthur Moseley, a native of Sydney, and also of Dr. Vaughan E. Black, of Moose Jaw, a native of Amherst, N.S.

Dr. C. H. Morris, of Windsor, has returned from Europe where he attended as a member of the Vimy Ridge Pilgrimage. On his return he gave an address to the Rotary Club on his experiences during the trip.

N. B. DREYER

Ontario

Owing to the death of the President of the American Medical Association, Dr. Charles Gordon Heyd, the elected Vice-President, becomes President. Dr. Heyd is a member of the College of Physicians and Surgeons of Ontario, and was born and educated in Brantford, Ont. He qualified for practice in Ontario following his graduation from the University of Toronto. Dr. Heyd is Professor of Surgery at the Post-Graduate Medical School and Hospital, Columbia University.

While Dr. J. G. FitzGerald is on leave of absence, Dr. R. D. Defries is acting as Director of the School of Hygiene; and he and Dr. Charles Best are joint directors of the Connaught Laboratories.

Dr. J. D. Heaslip has been appointed Superintendent of the Guelph Reformatory.

Extensive additions, costing $100,000, are being made at the Connaught Laboratories Farm, to provide further facilities for the manufacture of serums and toxins.

One of the local newspapers announces that a committee has been appointed by the London Academy of Medicine to prepare a "central registration of delinquent accounts" for patients who do not pay their medical bills. An attempt is being made to classify the debtor patients into four principal groups,—those unable to pay, those unduly slow in paying, those who are untraceable, and "floaters" who go from doctor to doctor.

Various numbers of the *Ontario Gazette* since July 11th announce the following appointees as Chief Coroners and Coroners,—

Chief Coroners.—Drs. S. B. Biehn, Parry Sound, District of Parry Sound; A. J. Bromley, Cayuga, County of Haldimand; Wm. H. Brydon, Brampton, County of Peel; D. J. Dolan, Alexandria, County of Glengarry; Albert Downing, Carleton Place, County of Lanark; D. L. Ewin, St. Thomas, County of Elgin; P. E. Laflamme, Sudbury, District of Sudbury; Ralph T. Maclaren, Whitby, County of Ontario; J. S. McCullough, New Liskeard, District of Temiskaming; Leo Poirier, St. Catharines, County of Lincoln; Thos. F. Robertson, Brockville, County of Leeds; H. C. Rundle, Brighton, County of Northumberland; A. B. Rutherford, Owen Sound, County of Grey; J. C. Smith, Lakefield, County of Peterborough; F. G. Wallbridge, Belleville, County of Hastings; F. C. Wilson, Napanee, Counties of Lennox and Addington; D. R. Young, Emo, District of Rainy River; J. M. Young, Windsor, County of Essex; A. J. Craven, Brantford, County of Brant; A. S. McCaig, Sault Ste. Marie, District of Algoma; J. G. L. McDonald, Little Current, District of Manitoulin; Peter McLaughlin, Winchester, County of Dundas; C. F. McPherson, Prescott, County of Grenville; J. Victor Menard, Verner, District of Nipissing; Martin Powers, Rockland, Counties of Prescott and Russell; A. R. Routledge, London, County of Middlesex; W. T. Shirreff, Ottawa, County of Carleton; E. W. Zumstein, Delhi, County of Norfolk.

Coroners.—Drs. H. C. Burleigh, Bath, Counties of Lennox and Addington; W. J. Henry, Jellicoe, District of Thunder Bay; M. G. Ranney, Callander, District of Parry Sound; J. P. Davies, Huntsville, District of Muskoka; G. W. Williams, Aurora, County of York; J. R. Ball, Chapleau, District of Sudbury; R. L. Carefoot, Markdale, County of Grey; W. K. Fenton, Islington, County of York; A. W. Gregory, Lambeth, County of Middlesex; G. L. Macdougall, Whitby, County of Ontario; C. W. Maitland, Collingwood, County of Simcoe; Thos. O. McLaren, Lancaster, County of Glengarry; Wilfred E. Throop, Frankville, County of Leeds.

Under an Order-in-Council, dated July 7, 1936, regulations have been promulgated under the Milk Control Act, whereby the Milk Board of the Province may license distributors, transporters and peddlers of milk. Provision is made that every milk plant and every operation connected with the handling of milk shall be subject to the inspection and approval of the Department. Every pasteurization plant and its operation shall be subject to inspection. Pasteurization is defined, and no person shall use any word or term suggesting that milk has been pasteurized unless handled in a plant subject to inspection and approval. The erection, alteration, or enlargement of such plants must be approved.

A memorandum has been issued by the Provincial Inspector of Hospitals advising all public hospitals in Ontario that the Province will accept responsibility for the hospitalization of transient indigents at a per diem rate of $2.00. This will be welcome news to our hospitals who have had serious difficulty in collecting maintenance for those without established residence.

The hospitals, however, are up in arms regarding the second paragraph in the same memorandum, announcing that, because of the "granting of public ward accommodation to patients who are in a position to pay a higher rate of maintenance, no Government grant shall be paid for any patient whose maintenance is paid

SCARLET FEVER

More than 9,000 cases of scarlet fever have been reported each year in Canada during the last ten year period. In 1935 there were more than 17,000 cases. Though the fatality is low, less than one death per 100 cases, the disease carries with it much disability not infrequently of a permanent character. Experience has shown that in hospitals where careful and persistent immunization has been instituted the incidence of scarlet fever can be effectively controlled (Can. Pub. Health J., 1934, **25**: 587; J. Inf. Dis., 1935, **57**: 136).

The value of scarlet fever streptococcus antitoxin as a prophylactic and therapeutic agent has been well established (Lancet, 1936, **231**: 559; J. A. M. A., 1933, **101**: 1444; J.A.M.A., 1934, **103**: 1049).

The following products are available from the Connaught Laboratories for use in the prophylaxis and treatment of scarlet fever:

SCARLET FEVER STREPTOCOCCUS TOXIN
(for Dick Test)

SCARLET FEVER STREPTOCOCCUS TOXIN
(for active immunization against scarlet fever)

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(refined and concentrated)

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or is to be paid in whole or in part to the hospital by the patient himself, or by any person, partnership, firm, association or corporation, other than a municipal corportion''. This means that for those admitted to public wards who themselves or through friends pay the present rate of $1.75 per day the hospital will receive no government aid. It is estimated that the average cost in large hospitals of such patients is $2.35 a day. The sanatoria for the treatment of tuberculosis at one time received government aid to the extent of 75c per day for those patients not paying over $1.50 per day maintenance. Some time ago this was reduced to 67½c per day. The sanatoria have now been advised that there will be a further reduction of 10c, making the government aid 57½c per day.

The annual post-graduate course of St. Michael's Hospital was held during the week of September 14th to 19th. The lecturers and clinicians were members of the hospital staff, with the exception of Dr. Counseller, of the Mayo Clinic, who spoke on the ''Medical aspects of gynæcology'' and Dr. Parfitt, of Toronto, who spoke on ''Certain chest conditions as revealed by x-ray examination''. The audience was composed of practitioners from every section of the province and general satisfaction with the program was expressed. With additional accommodation and equipment which will be afforded by the hospital buildings now in the course of construction it is anticipated that the series of lectures and clinics to be given during September of next year will mark a definite advance over any of the past.

The registration for this course increases steadily from year to year. The signed attendance this year was 70.

Lt.-Col. G. W. Lougheed, M.D., has been transferred to the Reserve of Officers, R.C.A.M.C. Major V. F. Stock, M.C., V.D., has been promoted Lieutenant-Colonel, June 1st, 1936. J. H. ELLIOTT

Dr. Madge Thurlow Macklin, of the University of Western Ontario, attended on September 7th, 8th and 9th, the first Cancer Institute of the University of Wisconsin at Madison, and gave one of the addresses.

Prof. C. C. Macklin, of the University of Western Ontario, attended the Fourth Federated International Congress of Anatomists at Milan, Italy, September 2nd to 8th, where twenty-four countries were represented. He gave an address on ''The perivascular interstitial tissue of the lungs as an air passage in the experimental production of massive collapse with pneumothorax''. He also presented the subject ''The mammalian pulmonic alveolar wall''.

Quebec

The XIVth Congress of L'Association des Médecins de Langue Française de l'Amérique du Nord was held in Montreal from September 7th to 10th, under the presidency of Dr. J. A. Jarry, of Montreal. The attendance was the largest in the history of the Association, some 600 being registered. The *congrésistes* hailed from various parts of Canada and the United States, Haiti, and France. Among the distinguished visitors were Prof. Emile Sorrel, of Strasbourg, Dr. Maurice Chiray, of Paris, Dr. William Meyer, of New York, and Dr. Chevalier Jackson, of Philadelphia (himself a descendant from a son of Old France, Jean Morange). Professor Sergent, so well known in this part of Canada, had been expected, but was, unfortunately, unable to come.

The Congress was formally opened on the afternoon of the first day by the Hon. Dr. J. H. A. Paquette, Provincial Secretary. It is worthy of note that in the annals of the Province of Quebec and the Association this is the first occasion on which the office of Provincial Secretary has been filled by a physician.

Dr. Donatien Marion, the Secretary, reported that the Association had materially increased in numbers and it was expected that in the future its activities would be expanded. A bulletin is being issued and is sent to 3,500 members.

On the first day the chief topic of discussion was ''Tuberculosis of the hip'', introduced by Drs. G. Samson, of Montreal, and E. Sorrel, of Strasbourg; and in the evening ''A study of BCG'', contributed to by Prof. J. A. Baudouin, of Montreal, and Drs. A. Frappier, A. Guilbeault and LaSalle-Laberge.

On the second day the subject was ''Abscess of the lung'', introduced by Prof. E. Sergent, whose paper was read in his absence by Dr. Rousseau, of Quebec, and continued by Drs. Chevalier Jackson, père et fils, of Philadelphia, N. Bethune and G. Deshaies, of Montreal. The discussion was led by Prof. E. W. Archibald. In the evening there was a public meeting, held in the interests of Public Health.

On the third day the subject was ''Gastro-pyloro-duodenal ulcer'', to which Drs. J. A. Mousseau, J. E. LeSage and Maurice Chiray (of Paris) spoke. The discussion was introduced by Dr. E. Saint-Jacques.

The fourth day was taken up with papers, clinics, demonstrations and exhibits on a variety of topics, in association with various hospitals.

A banquet was held on the last evening at which the distinguished visitors spoke.

A new feature of these conventions was the Scientific Exhibit, of instruments, remedies, pictures, charts, graphs, and books. Dr. Leo Pariseau had a specially fine display of some of his old books dealing with the history of tuberculosis. This innovation was much appreciated by the members. The Congress as a whole was a great success.

The next meeting, two years hence, will be held at Ottawa-Hull.

Dr. Leo Parizeau, Professor in the University of Montreal and Radiologist at the Hôtel-Dieu, has been granted the degree of Doctor of Science by Laval University, Quebec, *honoris causa*. Dr. Parizeau is well known as an expert in his specialty and has delved into the scientific aspects of radiology and diathermy. He has one of the largest private libraries on this continent on the subject of physical science and also has a fine collection of early books relating to the history of medicine and, particularly, of those connected with the early days in Quebec Province. Dr. Parizeau was the first president of the French-Canadian Association for the Advancement of Science.

Dr. A. H. Pirie, of Montreal, retired from the directorship of the X-Ray Department of the Royal Victoria Hospital on June 1, 1935. He is still devoting his time to x-ray and radium work, however, and is practising as Consultant in X-Rays at the Hospital, where he is in complete charge of x-ray treatments.

General

The XVth Concilium Ophthalmologicum will be held in Cairo, Egypt, from December 8 to 14, 1937. The two official subjects to be discussed are ''Arterial hypertension of the retina'' and ''Endocrinology and the eye''. Papers intended for reading at this conference should be sent directly to Dr. Marx, Oostzeidijk 316, Rotterdam, Holland. All other correspondence should be forwarded to the Secretary-General, XV Concilium Ophthalmologicum, P.O. Box 2001, Cairo, Egypt.

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Book Reviews

Atlas of Congenital Cardiac Disease. Maude E. Abbott, B.A., M.D., F.R.C.P.(C.), McGill University, Montreal. 72 pages, over 200 illustrations. Price $5.50. American Heart Association, New York, 1936.

Books such as this can only be produced occasionally. To begin with, they are products of long years' thought and toil and wide experience, and then the qualities necessary for such a production are not often found united in one person. Dr. Abbott's high place as an authority on cardiac development and disease is fully acknowledged by all, and it is our good fortune that she should have devoted her energies (some of her energy) towards this atlas. The work is divided into two main parts: I, dealing with the development and comparative anatomy of the heart, and II, a clinical classification of congenital heart disease. Under the latter, which comprises the greater part of the atlas, there are three groups: (*a*) cases with no abnormal communication; (*b*) cases of arterio-venous shunt with terminal reversal of flow; and (*c*) cases of permanent venous arterial shunt and retardation of flow. No better arrangement could be asked for. The sections on development in particular give in a few pages a connected view of development which is as clear as it is comprehensive. The notes on the cases under the various sections are full and satisfying. It is extraordinary, too, how much material has been shown in the illustrations. A word of praise must be said for the arrangement of the illustrations (no slight task), containing as they do such a variety of representations—photographs, electrocardiograms, x-rays, and diagrams. The book is a notable addition to Canadian medical literature.

Neurological Biographies and Addresses. Published for the Staff, to commemorate the Opening of the Montreal Neurological Institute of McGill University. 178 pages, illustrated. Price $3.75. Oxford University Press, London; McAinsh & Co., Toronto, 1936.

This volume has been published as a permanent record of the foundation and formal opening of the Montreal Neurological Institute in September, 1934. Introduced with a foreword by E. W. Archibald, the foundation lectures on Neurology by Gordon Holmes and Neurosurgery by Harvey Cushing will be found to present a comprehensive picture of the development, present status, and immediate future development of these two branches of medicine which have been making such advances in recent years. Wilder Penfield in his address traces the conception and growth of the Institute, which, with its modern construction and equipment, the result of patient thought and wise planning, offers rich opportunity for research and teaching in neurology as should inaugurate in this branch of medicine something "characteristically Canadian".

In the reception hall of the new Institute, decorated by Barnet Phillips, there is a frieze in which appear the names of Hughlings Jackson, Horsley, Sherrington, Charcot, Bernard, Nissl, Erb, Pavlov, von Monakow, Golgi, Cajal, Weir Mitchell, and Cushing, scientists of international fame, who have greatly advanced neurology. In this foundation volume appear thirteen biographical sketches outlining the life and work of these great men. No one can read this book of record of development and accomplishment without being stimulated. It is a record of beginnings and of pioneer work which should lead with promise and hope to a bright future of advance in our knowledge of neuropsychiatry and of the clinical application of that knowledge.

A Practical Handbook of Midwifery and Gynæcology. W. F. T. Haultain, Gynæcologist, Royal Infirmary, and Clifford Kennedy, Assistant Gynæcologist, Royal Infirmary, Edinburgh. Second edition, 356 pages, illustrated, price $4.50. E. & S. Livingstone, Edinburgh, 1935.

As a practical handbook of use to students and practitioners this compendium should prove invaluable. Presenting as it does in succinct method a complete outline of the subject, it naturally avoids controversial and theoretical matter, and of necessity propounds dogmatic teaching. That in comparatively few instances would the views of these authors be questioned by those who are engaged in practice and teaching is a tribute to the sound judgment of the writers. The arrangement of the subject matter is logical and readily accessible by means of an index. One might regret the lack of more details as to the rôle of the laboratory in the investigation and control of toxæmic pregnancies; and one would advise a freer and earlier use of intravenous glucose in hyperemesis gravidarum. The authors advise the use of vaginal douching in recent acute puerperal sepsis, a view that would arouse much criticism in most clinics. The chapters on gynæcological subjects are usefully arranged for their intended purpose, and the operative details are clearly set forth. The chapter on Adenomyoma includes the subject of endometrioma, a confusion which might have been avoided by including separate discussion of endometriosis as an entity. The book is well printed and will be a useful handbook for both teachers and practitioners.

Dr. Dafoe's Guide Book for Mothers. Allan R. Dafoe, O.B.E., M.D. 246 pages. Price $2.00. Smithers & Bonellie, Toronto, 1936.

The Quintuplets' First Year. Louise de Kiriline. 221 pages. Price $1.50. Macmillan Co., Toronto, 1936.

One would almost suppose that we have heard enough about the Dionne quintuplets. What is there that we do not know about them? And yet how extraordinarily fresh the subject remains. Hear Dr. Dafoe talk about them and immediately one's attention is attracted and held. It is not any different when he writes about them as he does in this. For he has made them the text of talking about babies in general and the result is excellent. Those who have heard Dr. Dafoe speak, and the number must run into very high figures, know his simple, clear and modest manner of speech, always with the priceless thread of humour that he carries through everything. His book is written in the same clear and direct manner, and should be a valuable guide to very many parents, in all walks of life.

Madame de Kiriline's book gives her story of the care of the quintuplets during the first year of their life. Madame de Kiriline herself wrote with the idea, as she says, of proving that no more extravagant care did the quintuplets enjoy during their first year of life than is the birthright of every baby born, and she has proved her point with great success.

Dental Infection and Systemic Disease. R. L. Haden, M.A., M.D., Chief of the Medical Division, Cleveland Clinic. Second edition, 163 pages, illustrated. Price $2.50. Lea & Febiger, Philadelphia, 1936.

The large number of cases referred to by the author which substantiate the theory of focal infection is very striking. Dr. Hayden is to be congratulated upon his results, and thanks are due to him for the enormous amount of work entailed. It is certain that by reading this book every dentist would have a keener sense of appreciation of dentistry as a health profession, and it is sincerely recommended. This book should be in every dental school library, and reference made to it by members of the teaching staff.